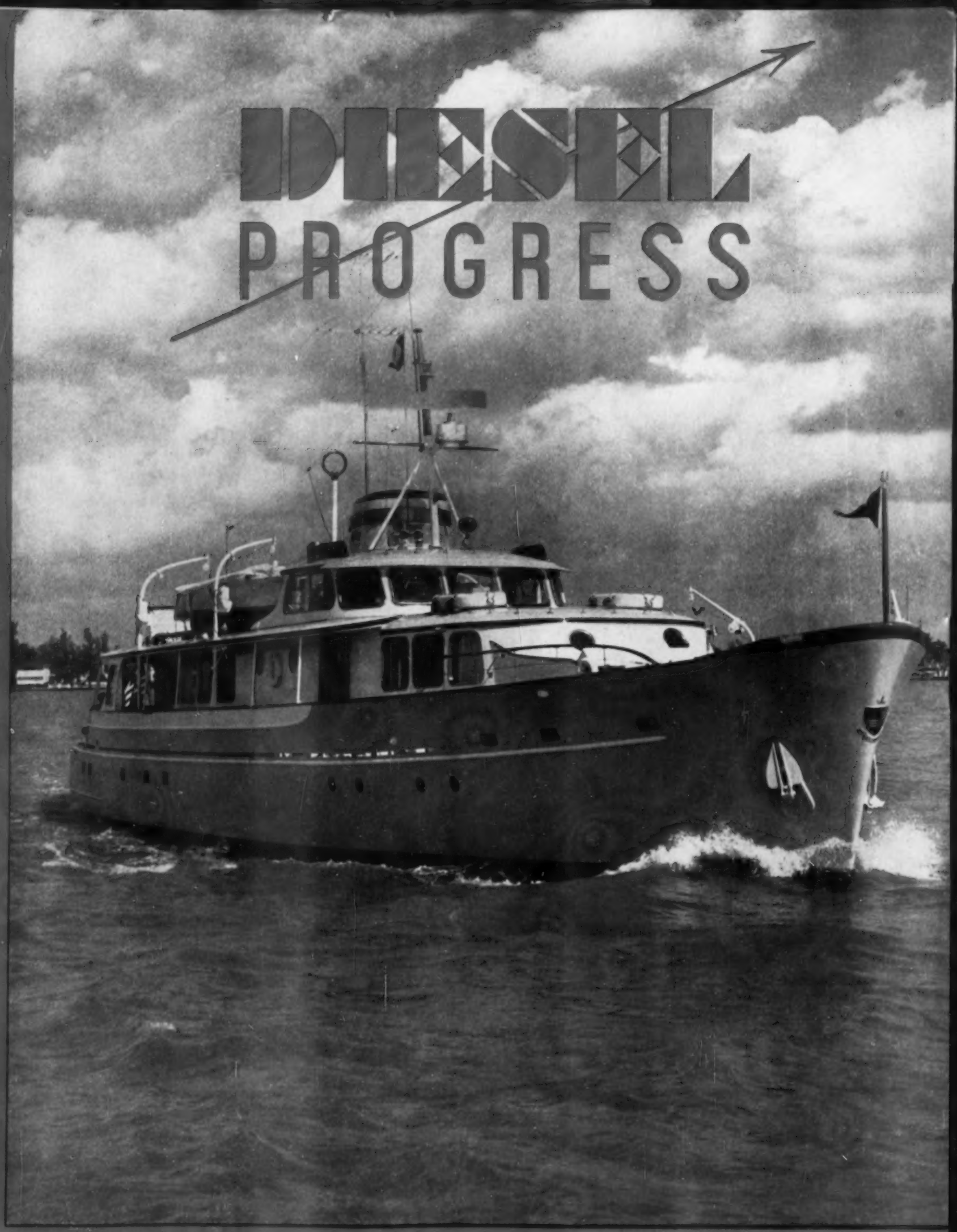
DIESEL PROGRESS

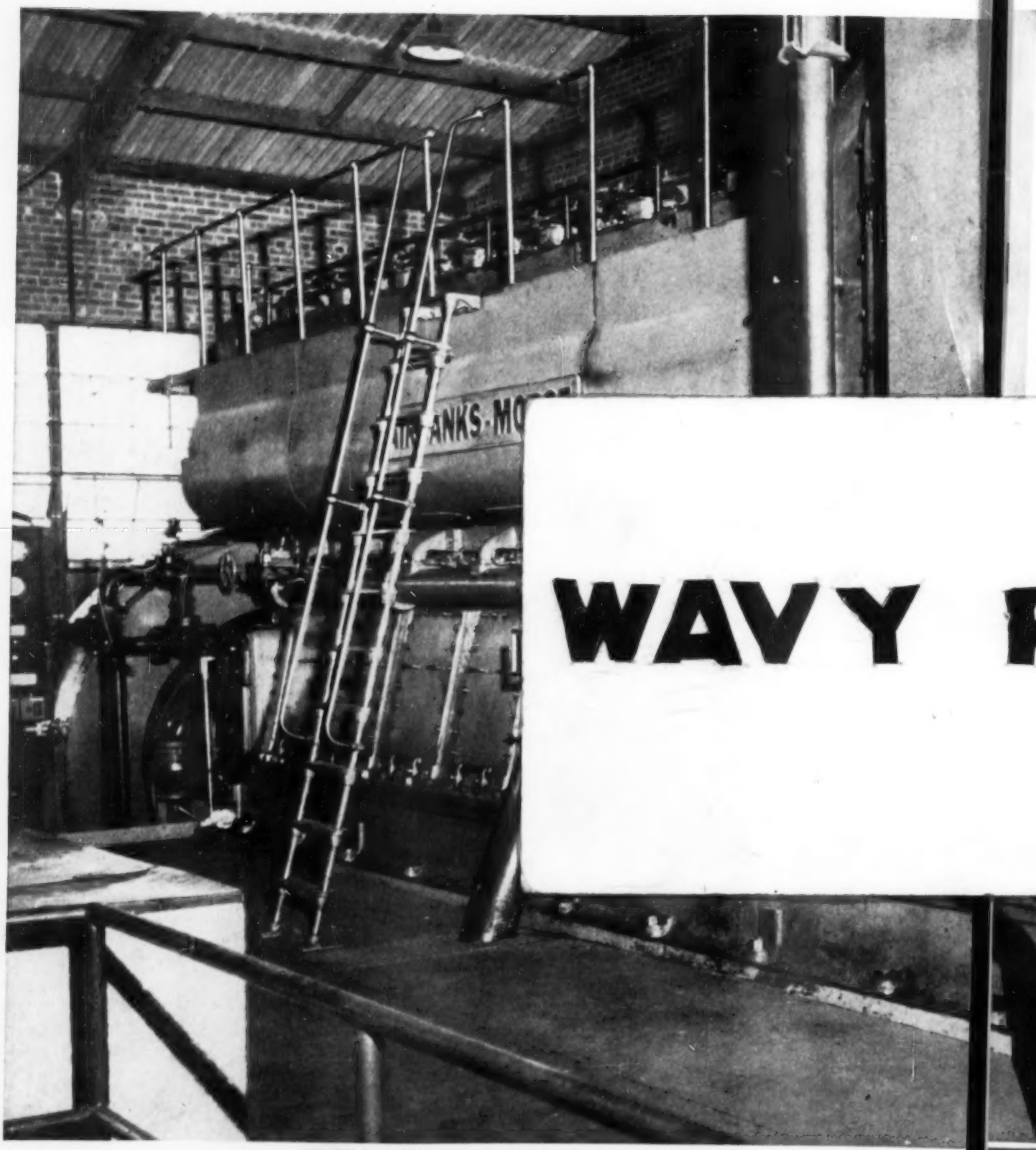
IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR



FIVE DOLLARS PER YEAR

JANUARY, 1956

FIFTY CENTS PER COPY



WAVY

TUNE IN:
TEXACO STAR THEATER
starring
JIMMY DURANTE
on TV Saturday nights.
METROPOLITAN OPERA
radio broadcasts
Saturday afternoons.

TEXACO

TEXACO

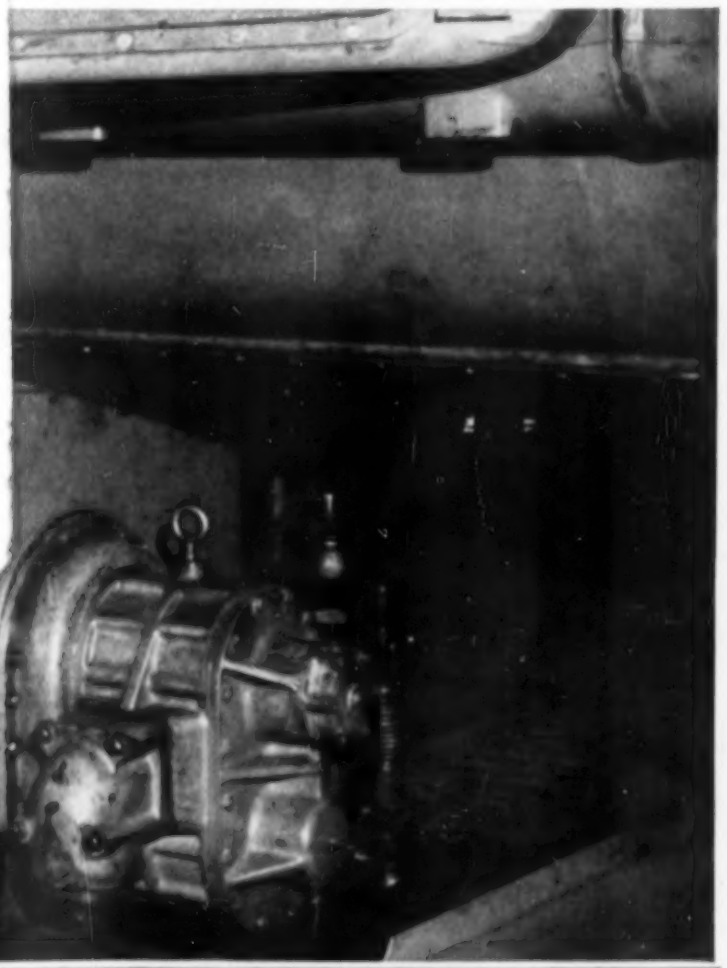
Get More Efficient Diesel Operation

WHEN you lubricate with one of the famous *Texaco Ursa Oils*, diesels deliver *more power* with *less fuel* over *longer periods* between overhauls. Performance is clean, dependable—maintenance costs are low.

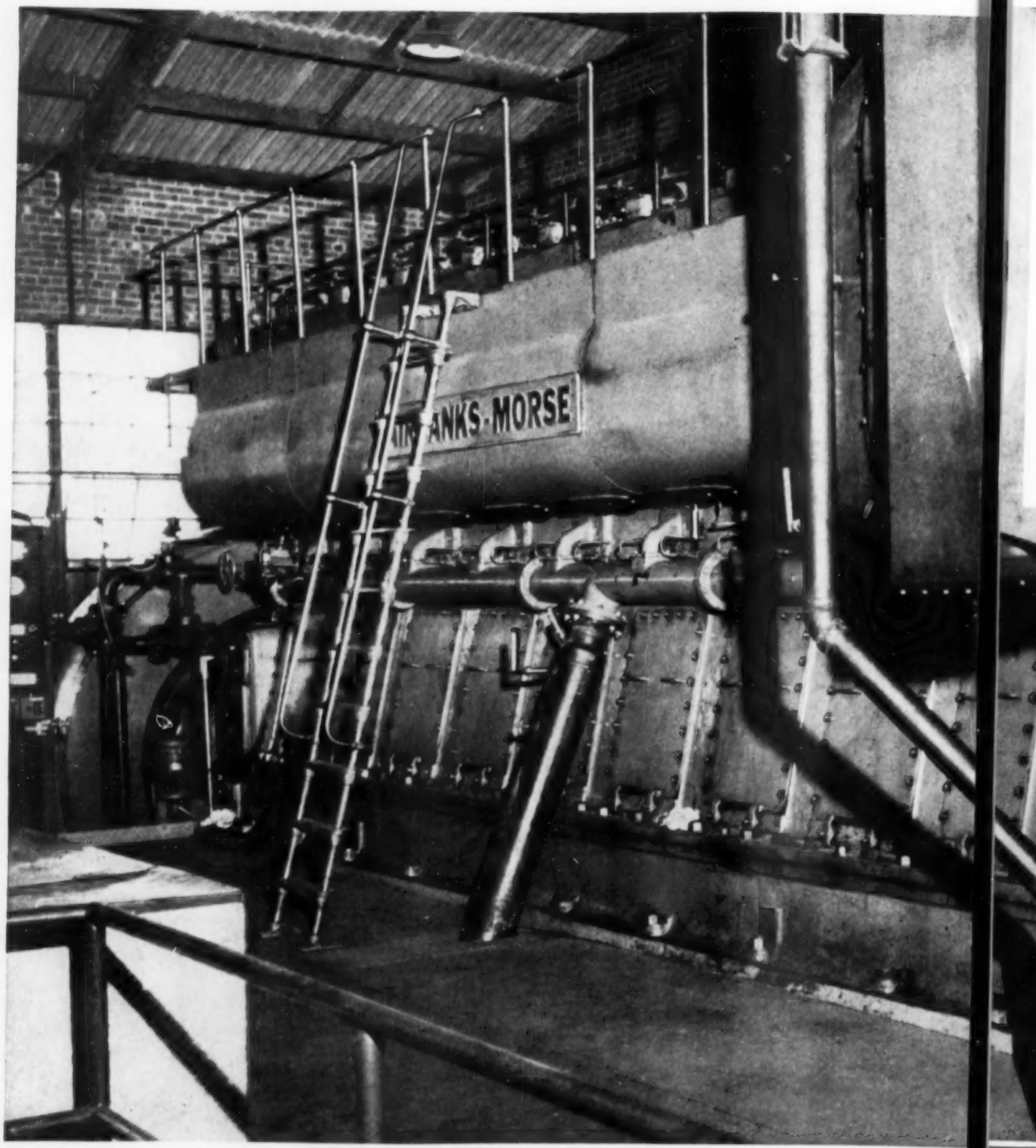
Consistent delivery of these benefits has won top place for Texaco in diesel lubrication. In fact—There is a complete line of *Texaco Ursa Oils* especially refined and processed to meet the requirements of all diesel, gas and dual-fuel engines. A Texaco Lubrication Engineer will gladly recommend one to assure you a high-efficiency, low-cost operation.

Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

PAGES



URSA OILS FOR ALL DIESEL, GAS AND DUAL-FUEL ENGINES



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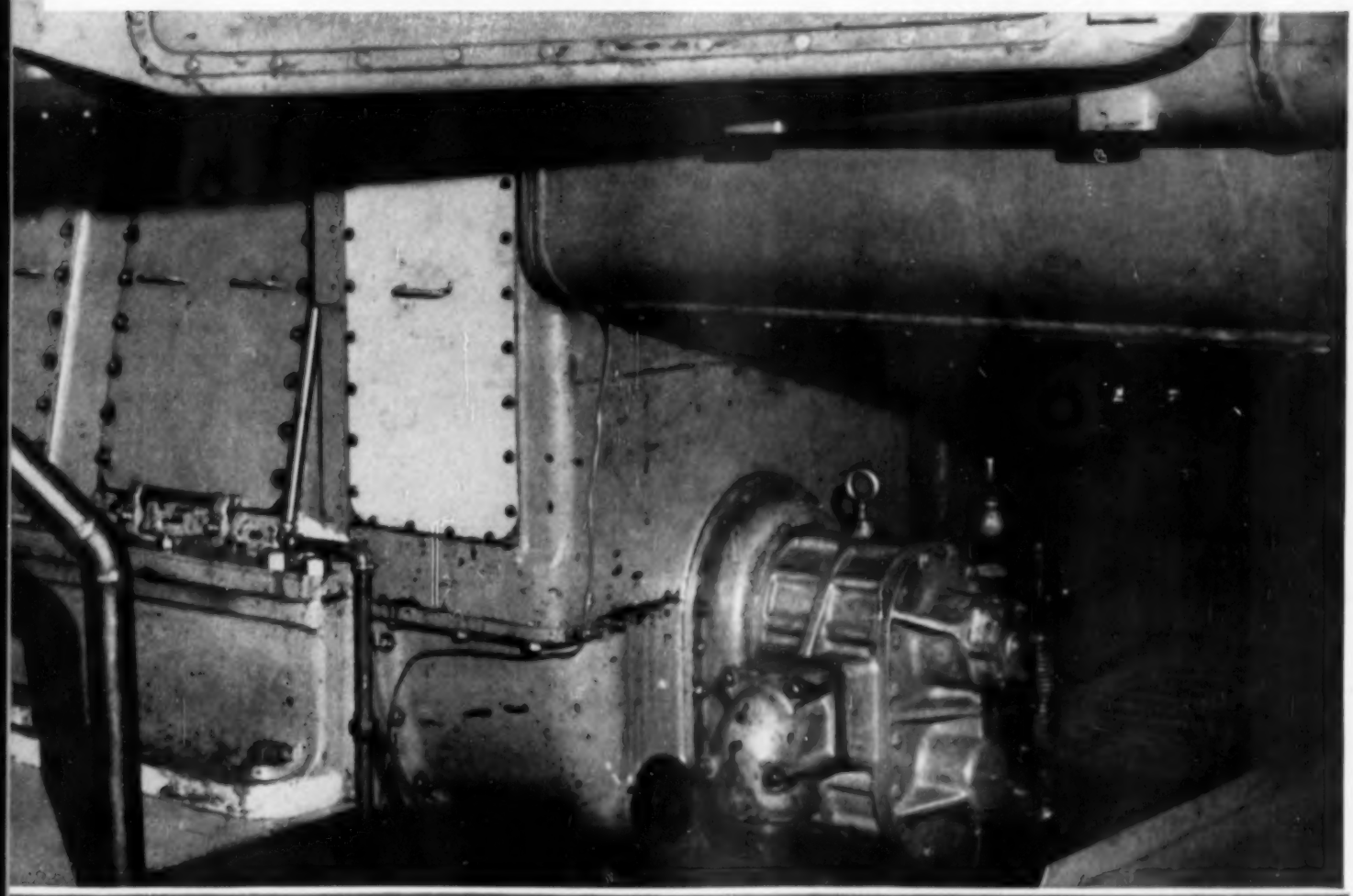
Consistent delivery of these benefits has won top place for Texaco in diesel lubrication. In fact—

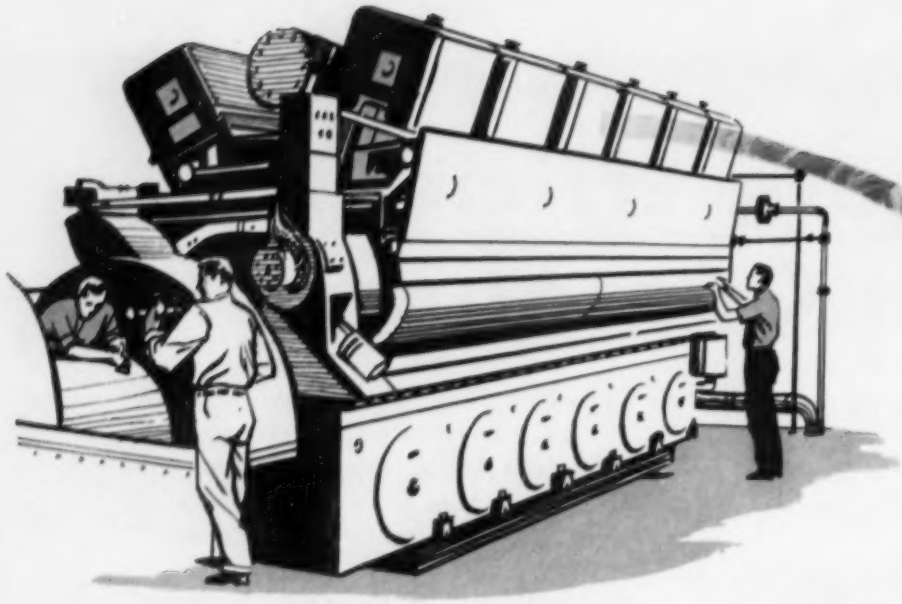
For over 20 years, more stationary diesel h.p. in the U.S. has been lubricated with Texaco than with any other brand.

There is a complete line of *Texaco Ursa Oils* especially refined and processed to meet the requirements of all diesel, gas and dual-fuel engines. A Texaco Lubrication Engineer will gladly recommend one to assure you a high-efficiency, low-cost operation.

Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

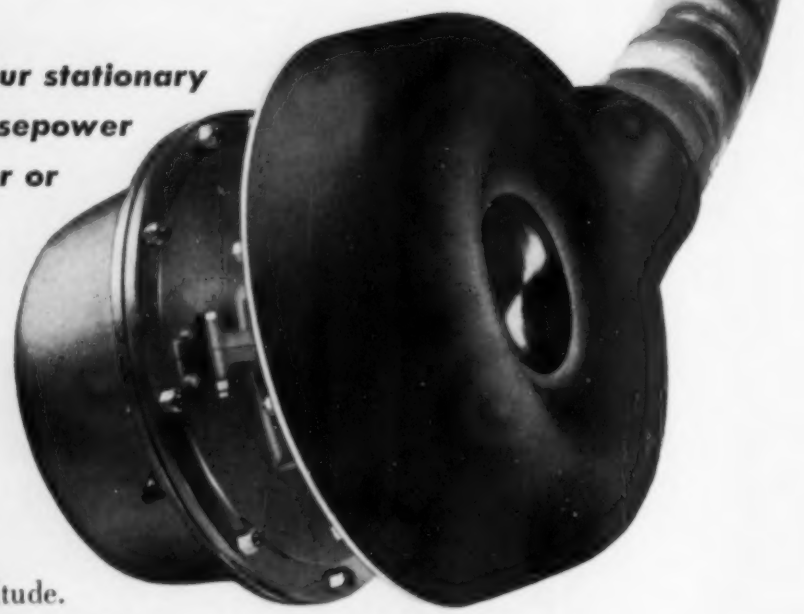


URSA OILS FOR ALL DIESEL, GAS AND DUAL-FUEL ENGINES



BOOST DIESEL OUTPUT

with less fuel...less noise...less smoke



AiResearch Turbochargers give your stationary or mobile diesels more added horsepower than any comparable turbocharger or supercharger installation!

The application of AiResearch Turbochargers to stationary diesel equipment will overcome excessive noise and smoke problems... jump horsepower to a much higher level... and cut your fuel bills on a horsepower per hour basis.

In addition, it will restore operating efficiency for your diesel power plants at altitude.

Application of these finely engineered power packages to mobile diesel equipment is equally effective... as has already been demonstrated in the remarkable results achieved by the installation of AiResearch Turbochargers on Caterpillar diesel machinery.

AiResearch is the largest producer of small turbomachinery in the United States, with twenty-five *million* hours of experience. This unmatched experience explains why AiResearch Turbochargers lead in power, economy and dependability. Your inquiries are invited.

THE GARRETT CORPORATION

AiResearch Industrial Division

9225 Aviation Blvd., Los Angeles 45, California

DESIGNERS AND MANUFACTURERS OF TURBOCHARGERS AND RELATED MACHINERY

DIESEL and GAS ENGINE PROGRESS

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IN INDUSTRY · IN TRANSPORTATION · ON THE SEA · IN THE AIR

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DIESEL PROGRESS for January, 1956, Vol. XXII, No. 1. Published Monthly by Diesel Engines, Inc., 816 N. La Cienega Blvd., Los Angeles 46, California. Phone OLeander 5-7410. Subscription rates are $5.00 for U.S.A. and possessions. All other countries $7.50 per year. Subscriptions may be paid the London office at £2-12s-6d per year. Accepted as Controlled Circulation Publication at Los Angeles, California.

DIESEL PROGRESS is indexed regularly by Engineering Index, Inc.

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FRONT COVER ILLUSTRATION

The *Rhonda III*, 96-foot yacht, powered by twin Superior Model 40-M3X-6 turbocharged engines each rated 490 max. bhp. It was designed by M. Rosenblatt & Son for Ingalls Shipbuilding Corp.

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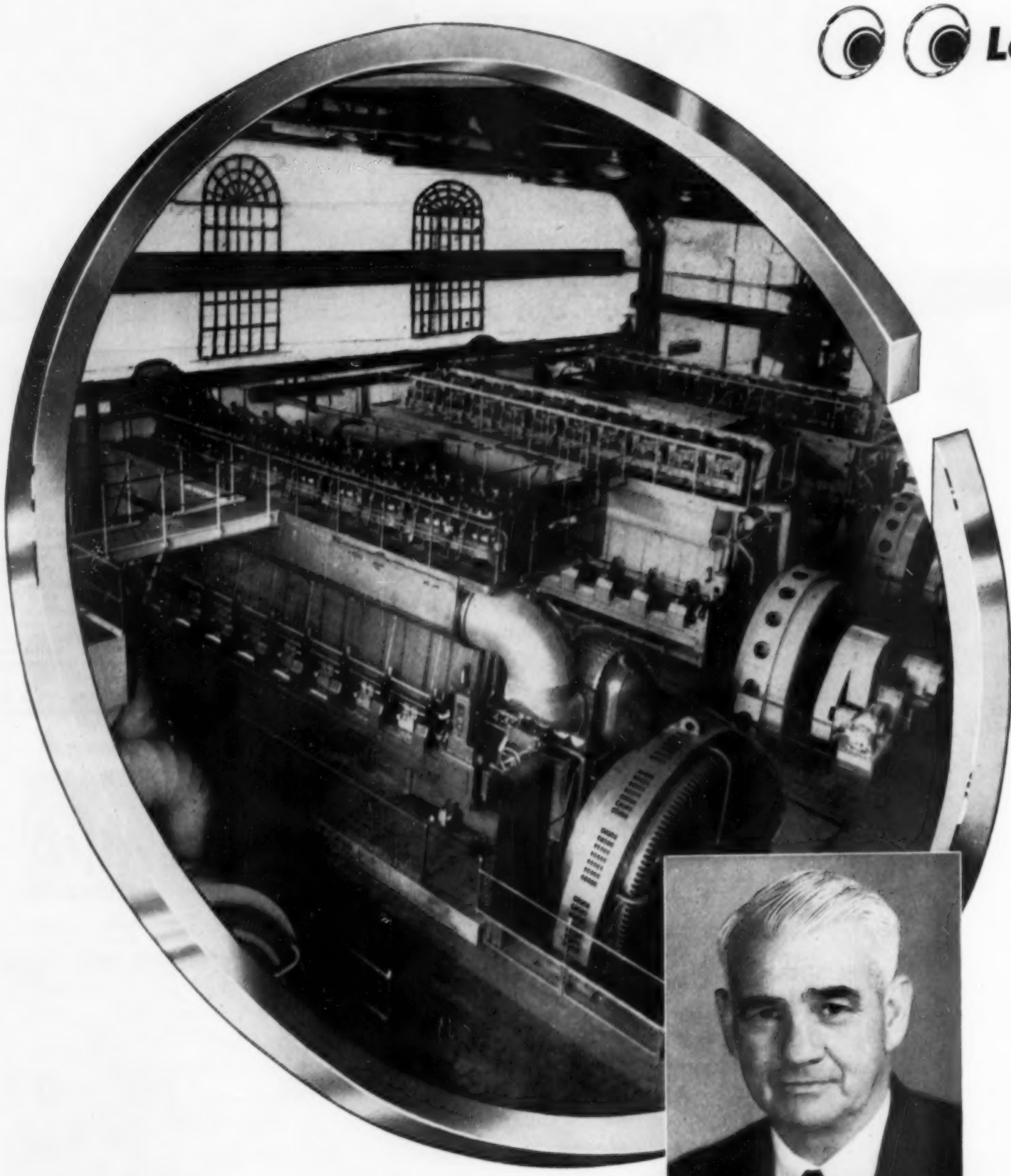

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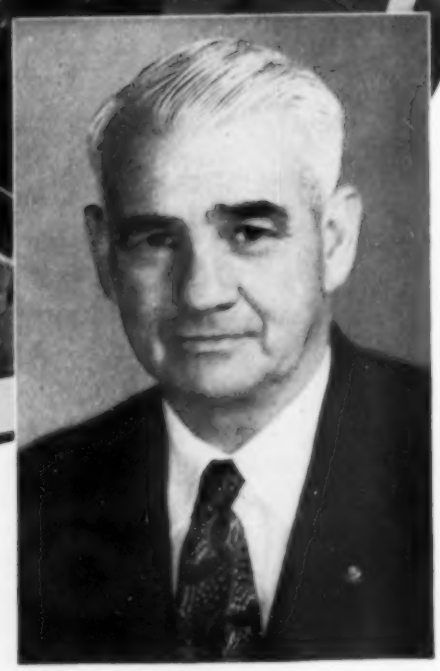


William E. Van Deusen
Chief Engineer

ok

to COOK for Better Rings!

COOK Piston Rings Help Rockville Centre Diesel Average Less Than .001" Cylinder Wear Per 1000 Hours!

SINCE 1928, the Rockville Centre (N. Y.) municipal power plant has consistently racked up some of America's most impressive performance records.

The performance of its No. 8 unit — a Nordberg Type TS-21-9 — is typical. After 25,037 operating hours *(2.86 years!)* inspection of the cylinders revealed the following:

1. Liners were in excellent condition — clean and free of lacquer and carbon.
2. While several rings were renewed in Grooves 1 and 2, no rings were renewed in Grooves 3, 4, 5 and 6, and these can run for an additional 10,000 hours.
3. *Cylinders averaged less than .001" maximum wear per 1000 hours of operation!*

This record is a tribute to Rockville Centre's management and operating personnel, and C. Lee Cook piston rings.

If you're looking for a seal with the savings built in, mail the coupon for product information and the name of your nearest C. Lee Cook representative.

TENSION THAT NEVER WEARS OUT!

Cook Piston Rings are tensioned on a Cook-designed machine which accurately controls the amount and distribution of tension. This exclusive process gently "squeezes" tension into the rings, with a series of small indentations—avoids harmful disarrangement of the rings' molecular structure. *The result is constant, uniform tension that never wears out!*

C. LEE COOK COMPANY

Sealing Pressures Since 1888

C. Lee Cook Company
916 South 8th Street
Louisville 3, Kentucky

Gentlemen: Please send me complete information on Cook Piston Rings and name of nearest representative.

Firm _____

Street _____

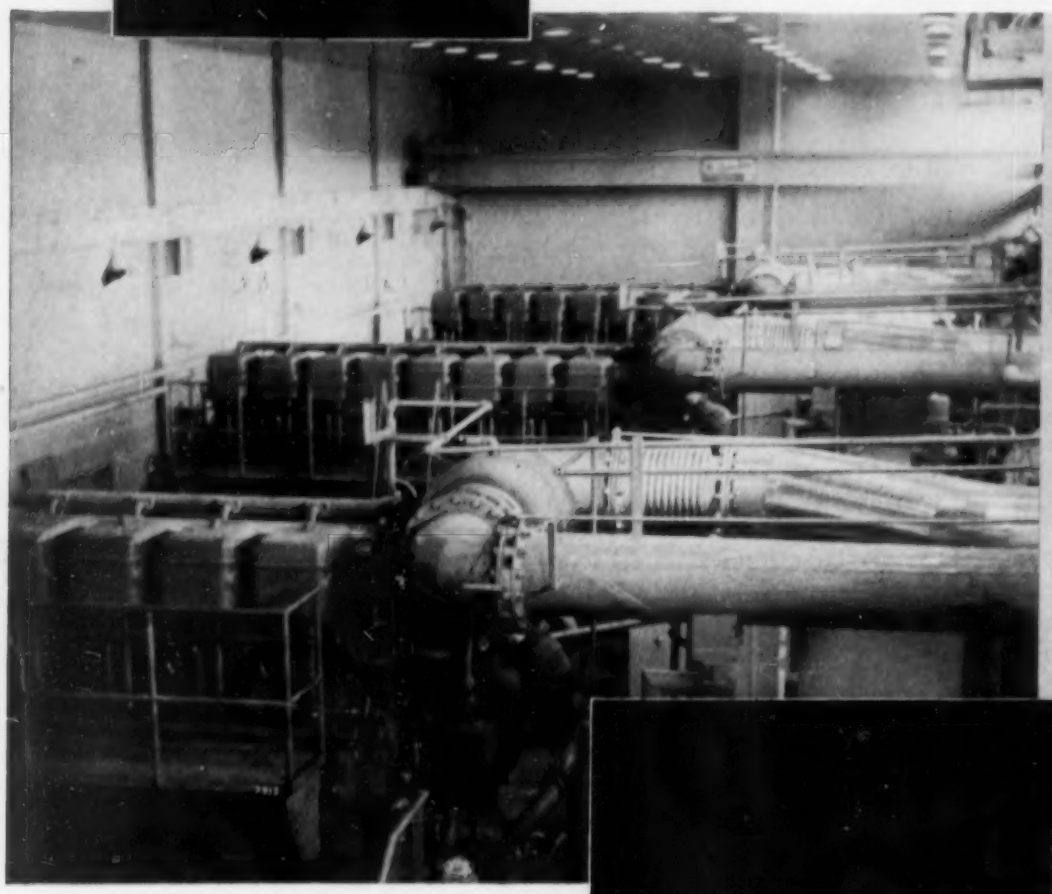
City _____ State _____

Attention _____

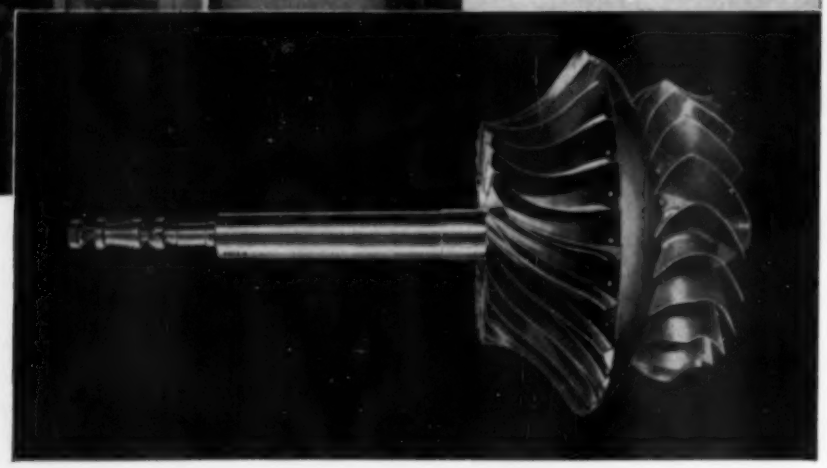
Type of Units _____

DE LAVAL
HIGH PRESSURE TURBOCHARGERS

efficiently serve diesels at Lakehead Pipe Line Company



Exclusive
MONOROTOR
Construction



Located in an outlying district in Northern Minnesota, this oil pumping station of the Lakehead Pipe Line Company must have *dependable, efficient* equipment. That's why Nordberg Diesel engines *with De Laval High Pressure Turbochargers* were chosen for this service.

The De Laval turbochargers efficiently utilize the exhaust gases to supply the high intake air requirements of these 1800 BHP, eight cylinder, four-cycle Supairthermal engines. Shown in the photograph are three units. Six other identical engines operate in pairs in three other stations of this company.

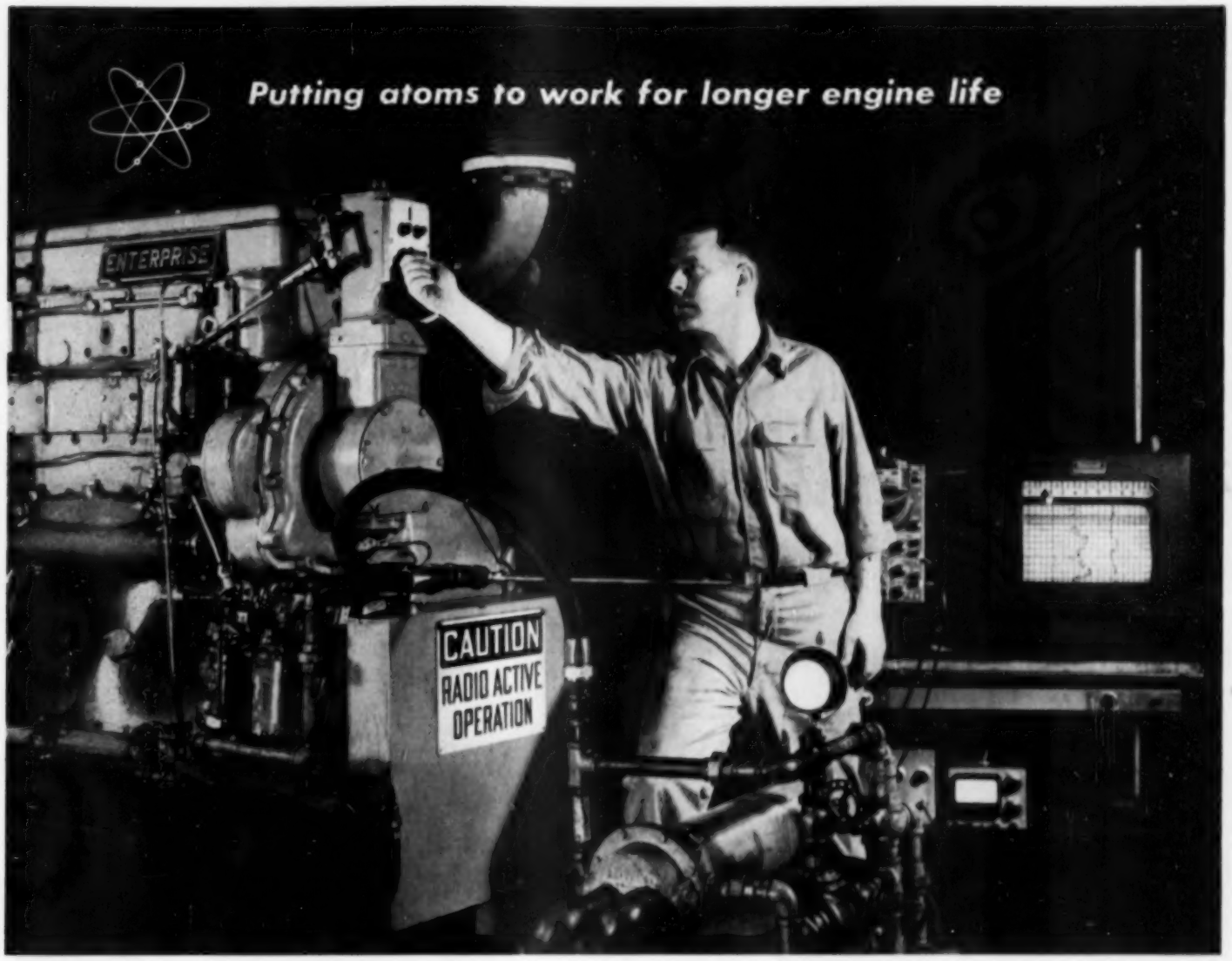
Due to the exclusive Monorotor design, De Laval High Pressure Turbochargers have a pressure ratio up to 3:1, as well as far higher pressure and turbine efficiencies than those found in conventional turbocharger systems. They are self-adjusting to engine loads, can be used with 4- *and* 2-cycle engines.

Write for De Laval Bulletin 8000 giving comprehensive curves and flow range diagrams.

DE LAVAL *Turbochargers*

DE LAVAL STEAM TURBINE COMPANY
883 Nottingham Way, Trenton 2, New Jersey

DL 384

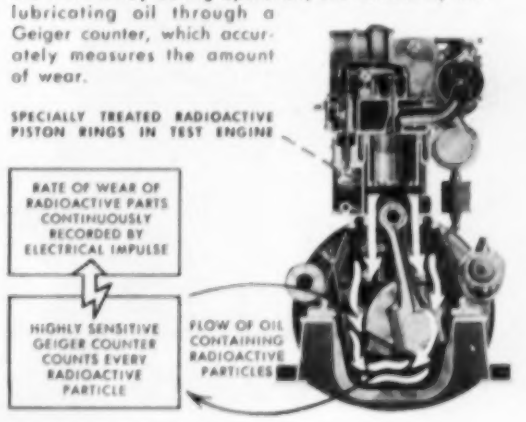


ENTERPRISE BUILDS MORE DUTY INTO HEAVY-DUTY ENGINES

—Through radioactive testing and research

Discovering the secrets of engine wear – building more life into engine parts... these are challenges constantly put to the research staff at Enterprise laboratories. And today – thanks to the scientific application of radioactive testing – many of the mysteries of what happens inside an engine – of how and why parts wear, are being solved. Because of tests like these, new concepts have come to bear in diesel engineering – in metallurgy, piston design, operating speeds, types of fuel and lubricating oil, and many other phases. The results? More work from Enterprise Engines at less cost, with longer engine life than ever before. For the best in diesel, dual fuel, tri fuel and spark ignited gas engines, specify Enterprise – for 35 years the quality leader.

In Radioactive tests, engine parts such as piston rings are first irradiated in an atomic pile, then put in an Enterprise test engine. Any radioactive particles which are worn away during operation, are carried by the lubricating oil through a Geiger counter, which accurately measures the amount of wear.


SPECIALLY TREATED RADIOACTIVE PISTON RINGS IN TEST ENGINE
RATE OF WEAR OF RADIOACTIVE PARTS CONTINUOUSLY RECORDED BY ELECTRICAL IMPULSE
HIGHLY SENSITIVE GEIGER COUNTER COUNTS EVERY RADIOACTIVE PARTICLE
FLOW OF OIL CONTAINING RADIOACTIVE PARTICLES

Over a million horsepower at work the world over!

ENTERPRISE *dependable* **ENGINES**

ENTERPRISE ENGINE & MACHINERY CO.
Subsidiary of General Metals Corporation
18th and Florida Streets, San Francisco 10, California
Export Department, New York

Boston • Chicago • Denver • Jacksonville • Kansas City • Los Angeles • Minneapolis • New Orleans • New York • San Diego • Seattle • St. Louis • Washington, D.C.

higher loads...
economy fuels...
new
engine designs...

there's one answer for all three of these lubrication problems—

Demands upon the lubricant in stationary industrial engines are increasing. More severe operating conditions caused by heavier loads, new engine designs and the use of economy fuels pose difficult lubrication problems not met by conventional oils. Standard Oil Company introduces a lubricant specifically designed to meet these problems—STANODIESEL Oil M.

STANODIESEL OIL M

STANODIESEL Oil M meets or exceeds the requirements of a lubricant for stationary industrial engines. Here's why:

STANODIESEL Oil M is refined from the highest quality base stock. It has superior stability.

Special additives are blended with this STANODIESEL Oil M base stock. An oxidation inhibitor prevents unwanted increases in oil viscosity and prevents corrosion of bearings. The action of detergent-dispersant additives keeps crankcase, pistons, cylinder walls and other parts clean. Contaminants are kept in suspension and are prevented from depositing. An anti-foam agent makes this oil suitable for use in hydraulic governors. A wetting agent increases the oil's ability to reach and maintain a film on such highly stressed parts as cams and cam followers.

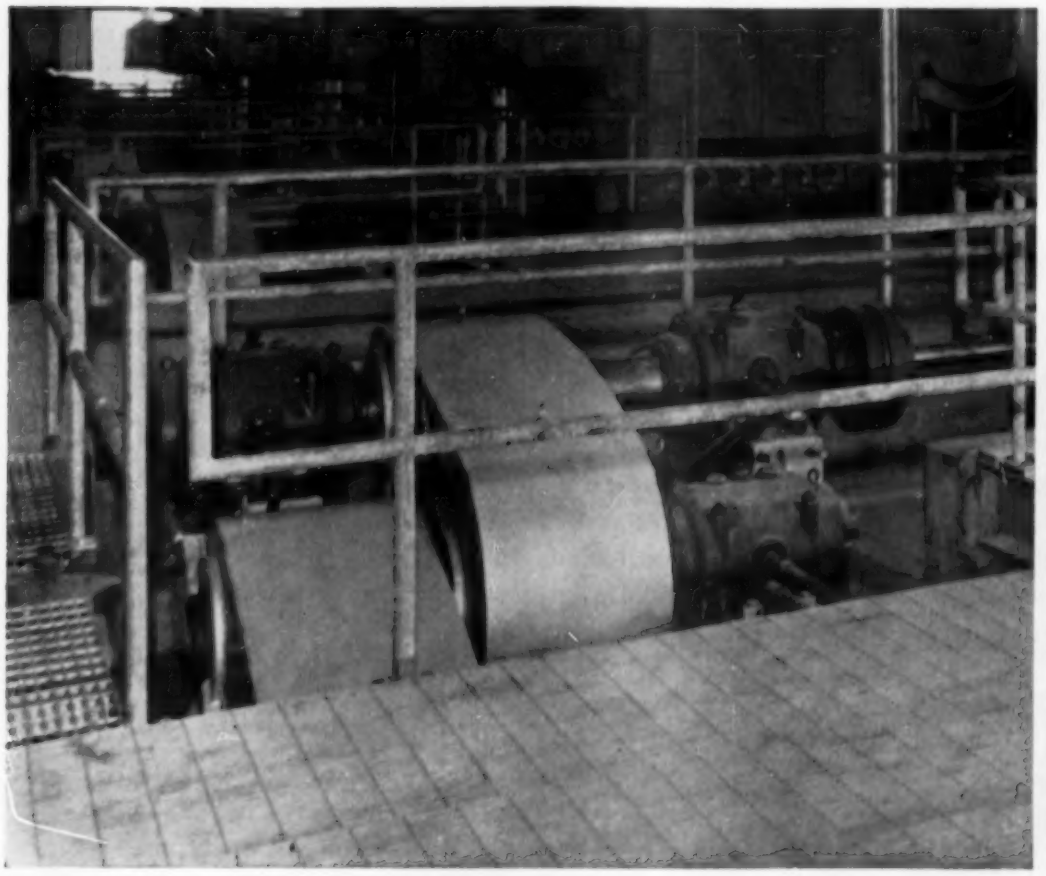
Use of STANODIESEL Oil M means this: less engine deposits, less ring and cylinder wear. Less spark plug fouling when used in gas engines. Eliminates fuel injector and pump sticking caused by deposits on the injector barrel and plunger when fuel and lubricating oil commingle.

You need to know about STANODIESEL Oil M. In the Midwest, call your nearby Standard Oil lubrication specialist. You will receive the information promptly. Or write Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD

STANDARD OIL COMPANY (Indiana)

WORLD'S LEADING ENGINEERS SPECIFY MORSE HY-VO DRIVES!



- FOR EFFICIENCY
- FOR DEPENDABILITY
- FOR ECONOMY
- FOR PERFORMANCE

Florida Flood Control Project: Dependable Morse HY-VO is on the job at the world's largest self-powered, low-lift pumping station. Designed to maintain a uniform water level in Lake Okeechobee, the project eliminates danger from floods and drought, permits the reclamation of 1100 square miles of potentially rich farm lands.

This pumping station houses six horizontal axial-flow propeller pumps, each with a capacity of 360,000 gallons per minute—a total capacity of 3.1 billion gallons per day! Each pump is driven by a 1600 hp opposed-piston diesel engine.

Morse HY-VO Drives were specified by the Army Corps of Engineers, as primary and secondary pump drives, for three reasons: (1) The field-proved performance of HY-VO assured round-the-clock dependability under severest operating conditions. (2) HY-VO permitted the use of lighter weight, lower cost engines. (3) Savings in required space for HY-VO Drives eliminated the need to increase the size of the buildings housing the pumping units.

This typical application of HY-VO is only one of a tremendous number where Morse HY-VO Drives are successfully used.

There are many reasons why Morse HY-VO is specified in applications demanding performance "extras": HY-VO's longer service life reduces per-hour operating cost; HY-VO is easy to assemble, install, and maintain on the job—keeps downtime *down*. Capable of transmitting up to 5000 hp in single-drive units, HY-VO runs at speeds up to 8500 fpm and makes possible the economies of using lighter weight, higher speed engines. HY-VO cuts vibration to a minimum, runs smoothly and coolly while transmitting power with less sprocket-tooth wear and more than 99% efficiency.

HY-VO is available from your local Morse Representative's stock. Wire, write, or phone him today, for complete HY-VO information. Put dependable Morse HY-VO to work cutting costs on your heavy-duty drive applications.

Find out, too, about the other quality products that your local Morse Representative stocks for your power transmission requirements: Morse Roller Chain, Silent Chain, Sprockets, Couplings, and Clutches. MORSE CHAIN COMPANY, INDUSTRIAL SALES DIVISION, ITHACA, NEW YORK.

MORSE BW **CHAINS, COUPLINGS, AND CLUTCHES**

KAHLENBERG CHOSE NAPIER

Napier turbo-blowers fitted to 2-stroke Marine diesel engines are currently increasing power output by at least 30% and even more on industrial applications. Or—if you prefer it this way—with a Napier turbo-blower you can get the same amount of power from a much smaller engine. Specific fuel consumption is no higher and can often be reduced. They are available in seven sizes to suit engines of approximately 140 h.p.—4,000 h.p.: multiple installations are available for engines of higher powers.

KAHLENBERG BROS. CO., have installed NAPIER Turbo-Blowers on their latest Model E6 Two-stroke, uniflow scavenge Marine Engine.

NAPIER Turbo-blowers

IN USE IN 71 DIFFERENT COUNTRIES

D. Napier and Son Limited. 211 The Vale, London, W.3.

REPRESENTATIVE: L. O. BROOKS, SUITE 909, DUPONT CIRCLE BUILDING, 1346 CONNECTICUT AVENUE, WASHINGTON 6, D.C.

ADC* REPORT

LOUISVILLE TRANSIT COMPANY, LOUISVILLE, KENTUCKY

adopts Shell ADC Oilprint Analysis as major oil change yardstick . . .

uses it for faster, surer Preventive Maintenance

LOUISVILLE TRANSIT COMPANY, noted for its preventive maintenance record, has adopted the ADC Oilprint Analysis. Result: reduced PM time and outstanding economy in labor and parts.

The ADC Oilprint Analysis enables fleet operators to test the condition of crankcase oil in the short time allotted for re-fueling and crankcase oil checks . . . a dependable evaluation in *minutes*. It answers the question "When do I change my oil?", thus eliminating the draining of usable oil and the risk of using oils loaded with contaminants.

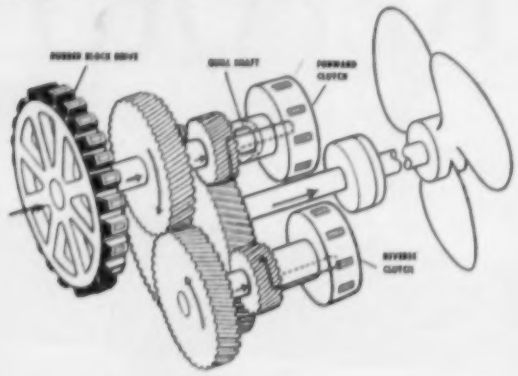
ADC Oilprint Analysis can take an active part in your PM program. Let us demonstrate how it can effect savings for your engines. *Trademark

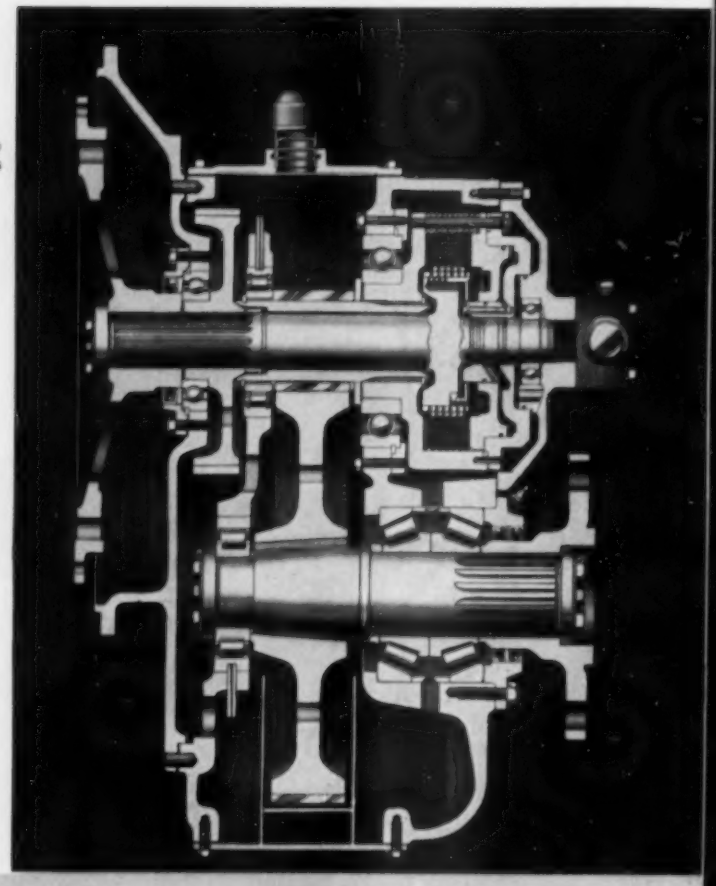
SHELL OIL COMPANY

50 WEST 50th STREET, NEW YORK 20, NEW YORK
100 BUSH STREET, SAN FRANCISCO 6, CALIFORNIA

SHELL

Unique arrangement of five hardened and ground helical gears, straddle mounted on short rigid shafts, plus two hydraulically actuated clutches permit the unusually short 17⅞" length.





NEW!
MG-511

Marine Reverse and Reduction Gear

For today's high speed, high horsepower marine engines, Twin Disc has spent three years of research, design and testing to develop a marine gear that is compact, smoother and faster on response, and easier to service. The new MG-511 is the answer to marine power transmission for engines up to 240 continuous hp at 2100 rpm.

Compact? The MG-511 is only 17⅞" from the SAE housing flange to the output propeller shaft flange! A unique arrangement of five carburized, hardened and ground helical gears, straddle mounted on short rigid shafts, plus two hydraulically actuated clutches permit this extremely short length. All gears in the MG-511 are mounted on antifriction bearings to reduce power waste. A rubber block drive is used to transmit power to the gear. The tough, time-tested rubber block drive withstands normal misalignment conditions without imposing undue loads or stresses on the marine gear input shaft or the engine crankshaft.

An oversize 10 gpm pump, driven by the marine gear reverse shaft, is used not only to actuate clutches — but also to pump oil into the heart of each clutch. This flood of oil carries away heat, assures smooth clutch engagements and substantially reduces clutch plate wear. Oil is also pumped to provide forced feed lubrication of meshing gears.

One of the outstanding features of the new MG-511 is the smooth engagement and disengagement of the forward and reverse clutches. This is accomplished through a differential mechanism in the selector valve, which permits a steady rise of actuating oil pressure from 30 psi to the maximum of 140 psi in smooth, even increments — in only one second. Further smoothness is also assured because of the flooded-in-oil plate stack. Forward, neutral and reverse are controlled by the selector valve.

Servicing the new Twin Disc MG-511 is an easy job because the clutches are located at the extreme

MG-511 On Display — Booths 113-114
National Motorboat Show

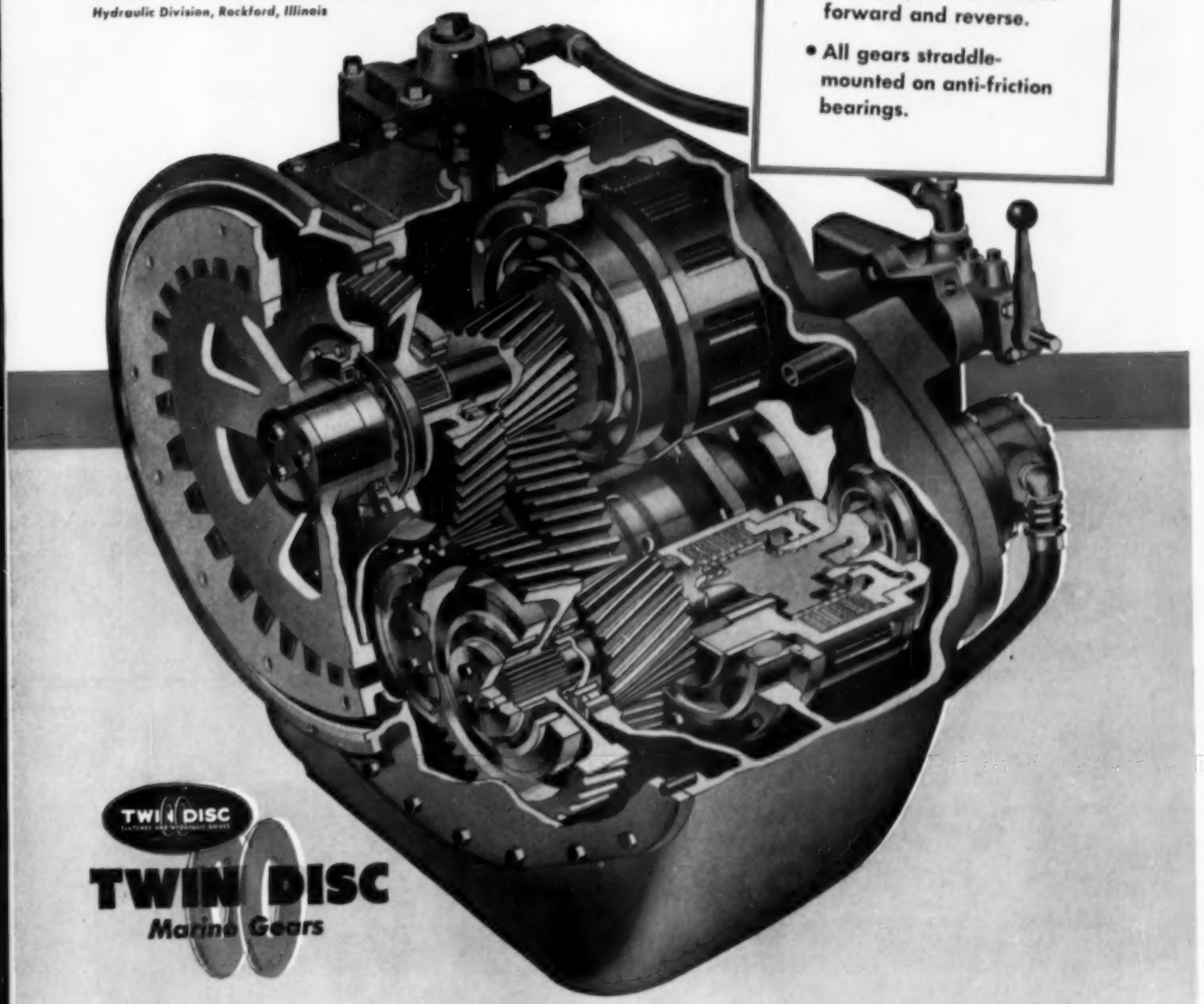
after end of the gear. Simply remove the cover plate cap screws, and the clutch driving plates are accessible for easy and speedy replacement, without need of disassembling the gear from the engine. The pump is serviced just as easily, as it plugs into the reverse shaft and is held in place by only four cap screws. Adequate inspection plates are provided to permit servicing other components.

The MG-511 is designed for full horsepower operation continuously in both forward and reverse output shaft rotations. This makes the gear ideally suited for twin-engine installations of right hand engines—or it can be adapted for left-hand engines by merely changing the oil pump.

With all these features – backed by Twin Disc's more than twenty years experience in building marine gears – the new Twin Disc Model MG-511 provides the answer to the marine industry's power transmission problems.

- **Ratios: 4.4:1, 3:1 or 2:1.**
- **Unusually short— 17⅞" length.**
- **Rubber Block Drive.**
- **Finger-Tip Control.**
- **Oil-Actuated, Oil-Cooled, Multiple Plate Clutches.**
- **All components easily accessible for servicing.**
- **Full hp operation in both forward and reverse.**
- **All gears straddle-mounted on anti-friction bearings.**

TWIN DISC CLUTCH COMPANY • RACINE, WISCONSIN
Hydraulic Division, Rockford, Illinois

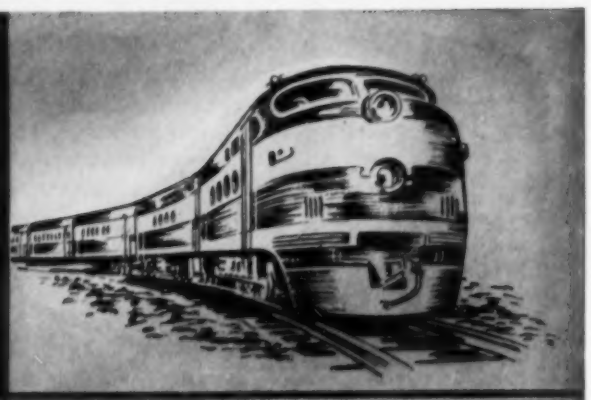


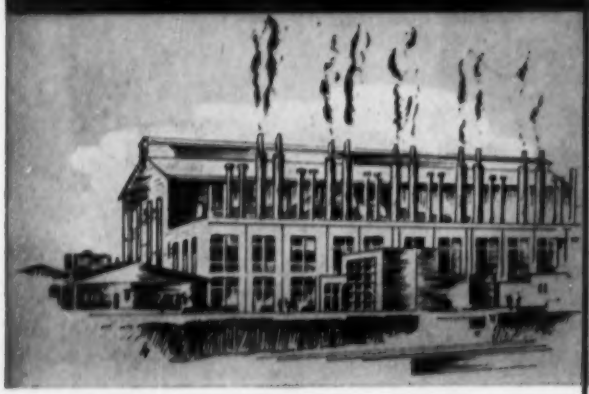
TWIN DISC
Marine Gears

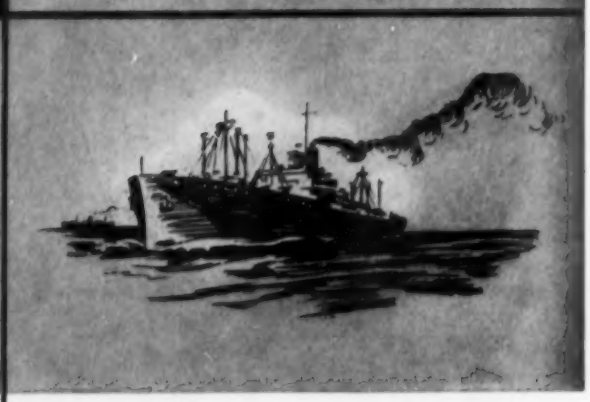
Dependable

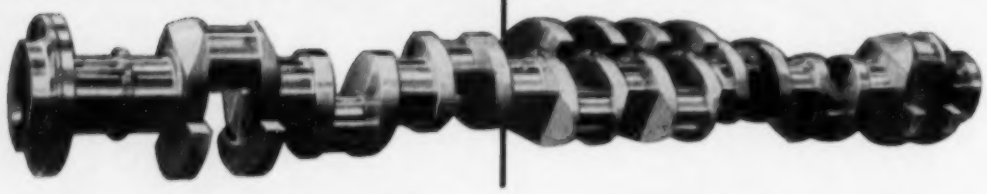
Transmission of Power . . .

ERIE FORGE
Diesel Crankshafts!









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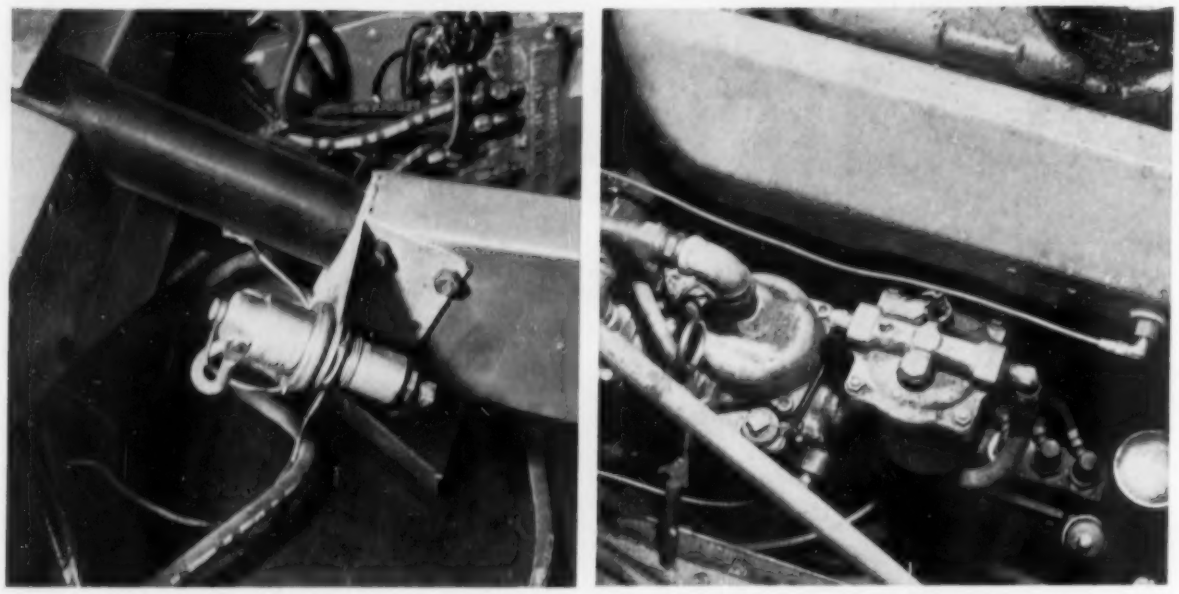
The Engineer's Field Report

CASE HISTORY
PRODUCT Chevron Pressure Primer System
FIRM Consolidated Freightways Inc., Portland, Oregon

Pressure Primer System starts diesels on 1st or 2nd turn with regular batteries—at minus 40°



BELOW ZERO starting temperatures are common 5 months a year for Consolidated Freightways equipment operating in Mountain and Plain States. Two hundred and forty-four of the company's tractors are equipped with the Chevron Pressure Primer System. Since this installation, rigs start on first or second turn at 40° below zero—using regular equipment batteries! Normally in these sub-zero temperatures, regular batteries give out after about 4 turns. Sure starts plus the fact engines are primed with Chevron Pressure Primer bulbs, controlled from within the cab, saves Consolidated Freightways important man-hours and speeds operating schedules. Picture above (left) shows a Chevron Pressure Primer Discharger mounted on steering column. Highly volatile priming fuel is atomized through tubing into manifold (right) under 250 lbs. pressure.

FREE FOLDER tells you more about Chevron Pressure Primer System and how to install it on different engines. Write or ask for it today.

FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your nearest distributor, write or call any of the companies listed below.

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Why Chevron Pressure Primer System helps starting

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Simple, rugged discharger prevents fuel leakage. Small, safe steel bulbs protect fuel from water and dirt.

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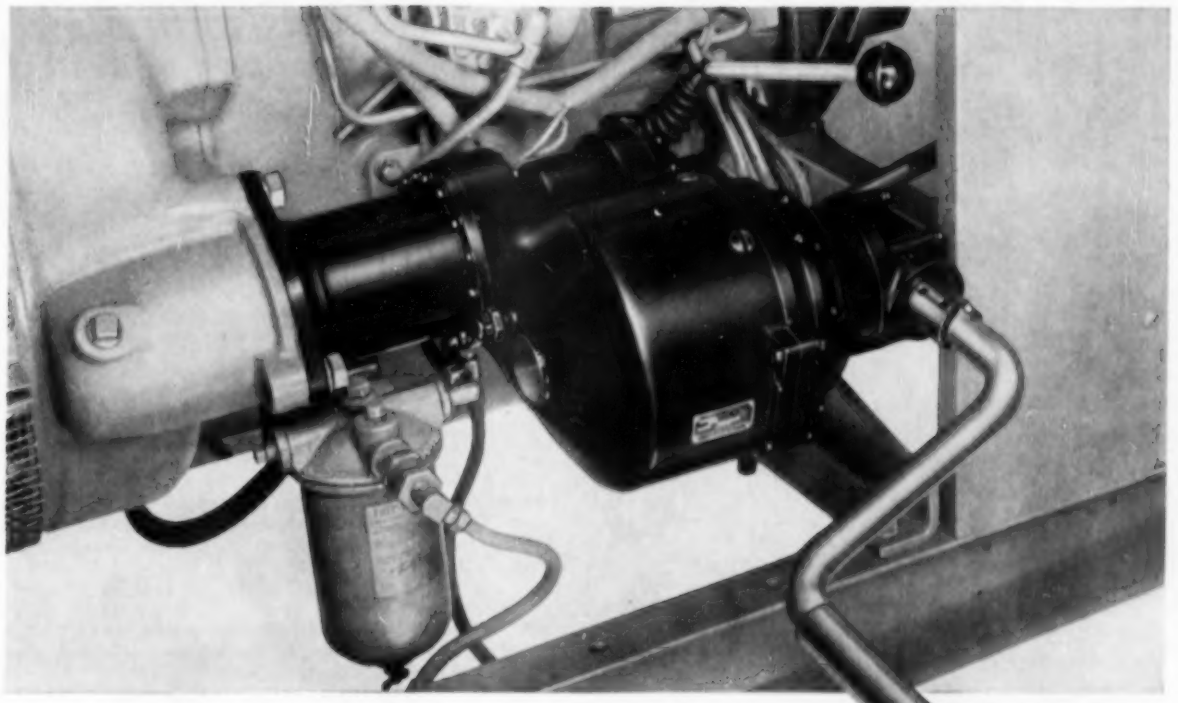
THE CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey • THE CALIFORNIA COMPANY, Denver 1, Colorado



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So . . . effective fuel oil filtration is absolutely essential. For your engine to keep running at peak efficiency and with minimum outlay for maintenance, its fuel system should be equipped with PUROLATORS in the three areas listed at the right.

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In the fuel line before the injection pump. A PUROLATOR here is an inexpensive way to assure smooth, wear-free operation of the injection pump.

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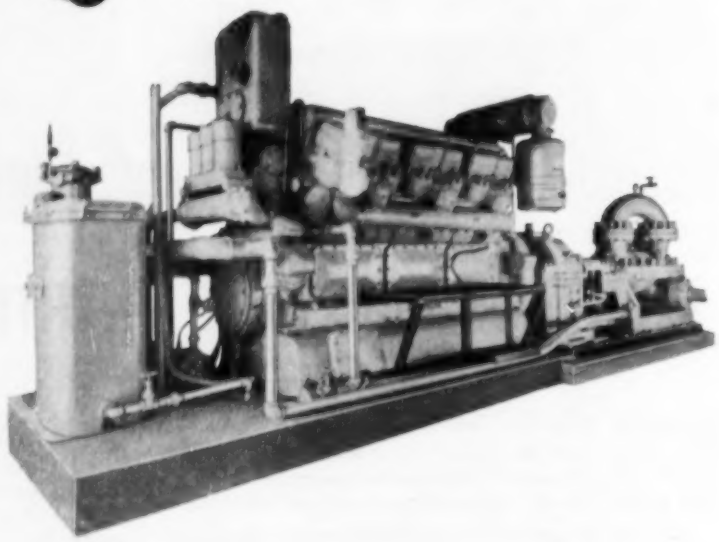

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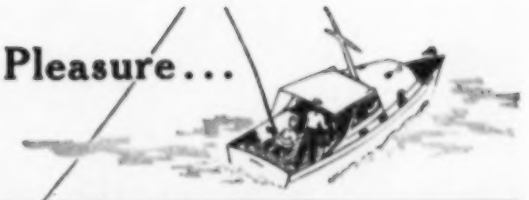

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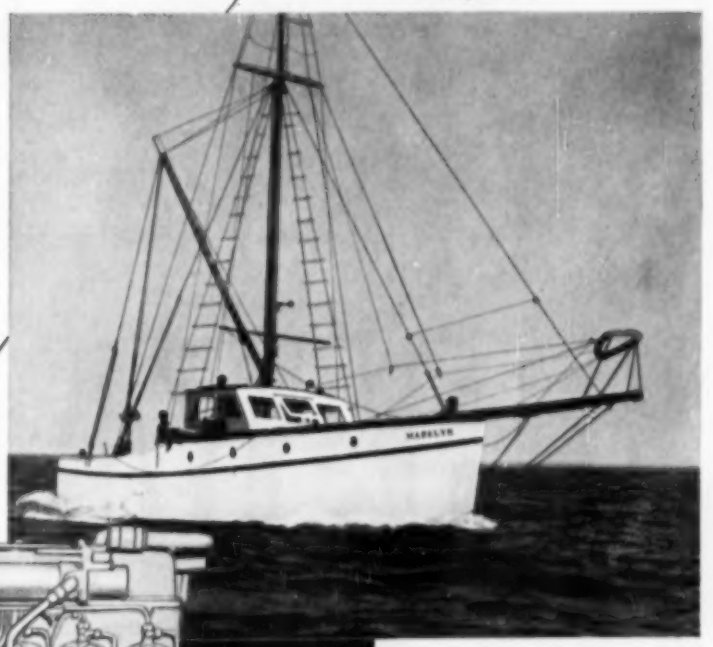
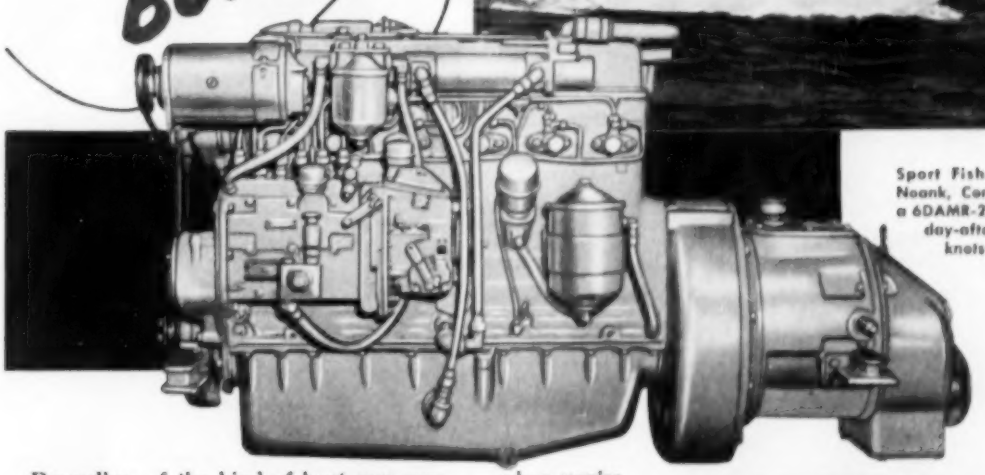
Allis-Chalmers 273 Diesel

gives you

MORE of BOTH



Sport Fisherman "Madelyn" Noank, Conn., repowered with a 6DAMR-273 Marine Diesel for day-after-day cruising at 8 knots @ 2100 RPM



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THE DIESEL ENGINE REIGNS ON INLAND WATERS

By A. D. BURROUGHS

THE diesel engine is king of the inland waterways. As 1956 makes its bow on what may be another record-breaking year, it is estimated that more than 80% of the inland craft are powered by diesels. And the shipyards along the waterways are all busy, making new installations. Many steam-powered towboats, with a number of years service left in their hulls, are being repowered with diesels. More and more of the 2000 operators are reaching their goal of complete dieselization.

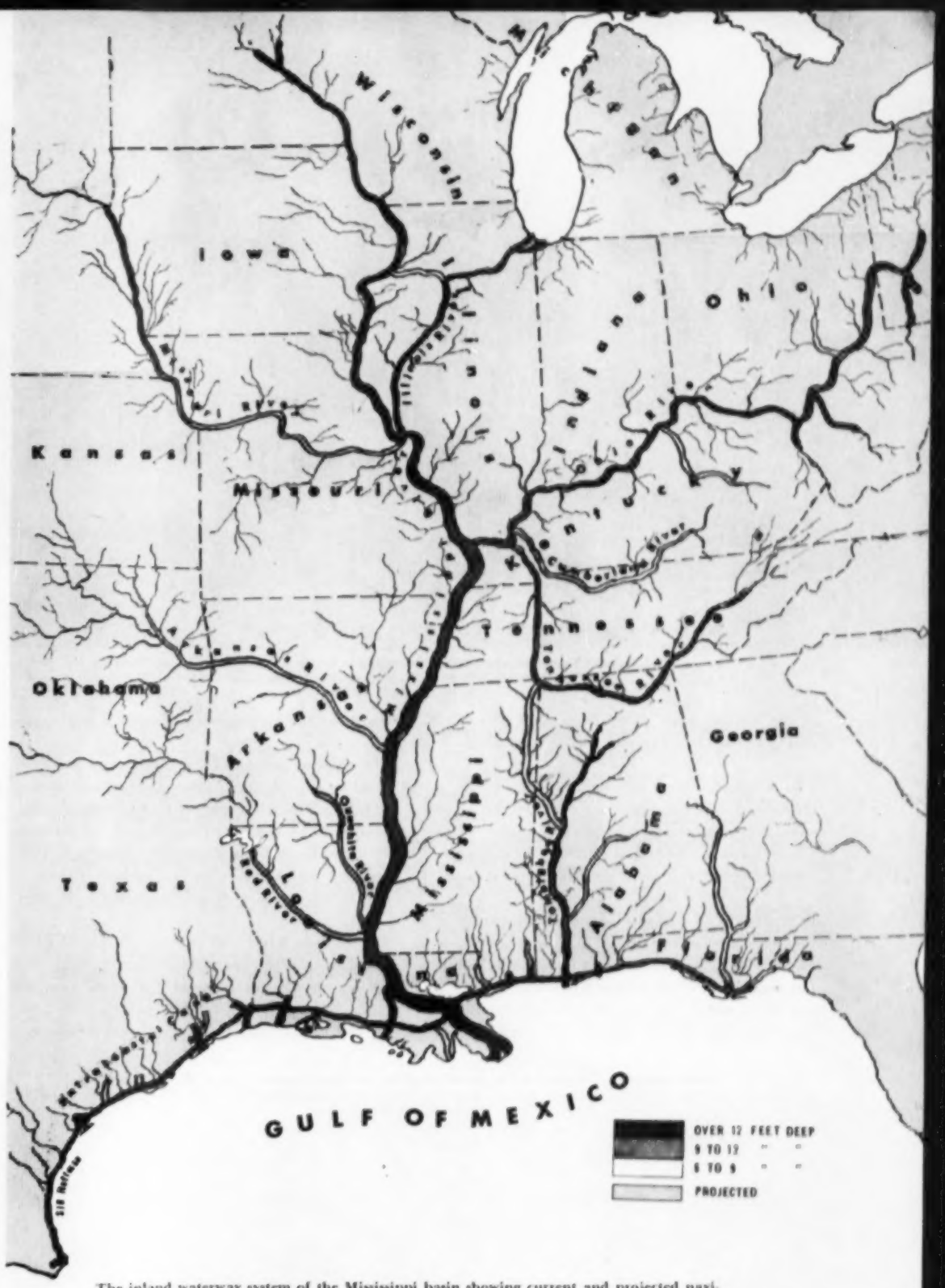
The steam era lasted 135 years during which the measure was size. The bigger the boat, the better. Today, however, in the reign of the diesel, the yardstick is economical work capacity. The boat that gives the most for the least is what is wanted, and that spells "diesel." The Federal Barge Line's new 3000-hp *Lachlan McCleary*, for example, is doing the work formerly done by two 1000-hp vessels at a daily cost of one-third less. (See DIESEL PROGRESS for August 1955.) Its record illustrates why there is a demand today for greater horsepower. Towboats with rated 3000-hp or more are becoming commonplace instead of novelties. Improved waterways, which extend the transportation season, make such powerful vessels, and bigger tows, feasible.

Yet, there are many supporters of, and specialized work for, smaller, less powerful but highly efficient and manueverable towboats. Dravo's Ram-class boats, for example, are turning in exceptional records for high tonnage and economy. The Allgire Rudderless boat, with diesels for propulsion and auxiliary power, is creating favorable comment because it operates well without equipment formerly considered essential.

Inland waterway authorities are wondering what type of boat will win recognition as the leader-type to represent the diesel era in the history books of the future. Because this is an age of specialization, and because certain types of boats do certain kinds of work best, there may be two or more leader-types instead of the single type in the days of steam.

But what is this great inland waterway system that offers such an extensive market to the manufacturers of diesel engines, accessories, generators, fuels and lubricants? It consists of 144 rivers, canals, and connecting links, forming a system with 28,383 commercially navigable miles.

Although there are important elements of the system elsewhere, the major portion of the network drains the heartland of North America into the Gulf of Mexico. Essentially, it is the Mississippi River and its tributaries. Deep-draft, ocean-going ships can sail up the Mississippi from the Gulf to Baton Rouge, La., a distance of 250 miles. A 9-ft. channel is maintained northward by the Army Corps of Engineers to the twin cities of Minneapolis and St. Paul. On the Upper Mississippi, a series of 27 locks and dams makes the 9-ft. depth possible in periods of low water.



The inland waterway system of the Mississippi basin showing current and projected navigable channels.

As the accompanying table shows, the Ohio River and its tributaries also are busy avenues for diesel-driven tows. The 981 miles of the Ohio connect the rich Pittsburgh industrial region with the Mississippi at Cairo, Ill. This historic road westward was canalized many years ago to a 9-ft. depth by 50 locks and dams. The number of these has been reduced and further reductions are planned to create deeper pools with higher dams.

Chicago and other Lake Michigan ports are tied into the system by the Illinois Waterway. It is one of the busiest water routes in America, having carried more than 120,000,000 tons since it was opened in 1933. It is actually a canal, 327 miles in length with a minimum channel of 9 ft.

The Missouri is no longer 761 miles of wild, unpredictable stream. A series of recent improvements including the Fort Peck, Garrison, and Fort Randall dams, has tamed it. With other improvements

The *A. H. Long*, owned by the Ohio River Company is shown behind a tow of eight coal barges. The vessel is powered by a 6-cyl. Baldwin marine diesel.

in the making, some of the most rapid growth in inland commerce is expected on the Missouri.

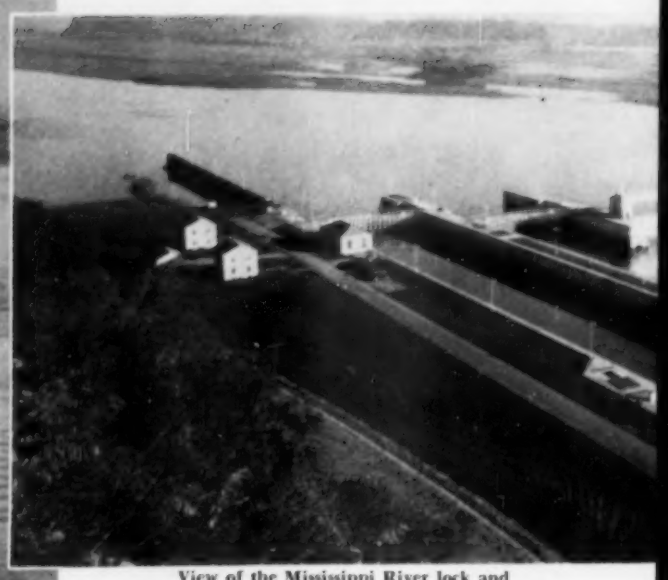
The heartland system is bounded on the north by the Great Lakes, a system apart and very important —one that will become even more important when the St. Lawrence Seaway is finished. On the south, paralleling the Gulf coast, is the Intracoastal Canal.

From the vicinity of the International border of Mexico, this waterway runs 1116 miles to Apalachee Bay in Florida. Its channel is 12 ft. Between Mobile Bay and New Orleans its width is 150 ft., elsewhere it is 125 ft. wide. The Warrior-Tombigbee connects, emptying into Mobile Bay, and important arms branch off the main course in Louisiana and Texas.

The Atlantic section of the Intracoastal waterway provides a protected avenue of commerce with a 12-ft. depth from Trenton, N.J. to Jacksonville, Fla. Southward to Miami, a channel of 12 ft. has been authorized with a 7-ft. depth on to Key West. Tows unsuited for the open sea can navigate the Intracoastal Waterways with little heed paid to weather.

The Hudson River and the New York State Barge Canal, both with dependable channels, tie another important segment of inland America into the system, connecting at the busy port of New York. On the Pacific Coast, the up-and-coming waterway

The *Aetna-Louisville* with 8 barges carrying 30,599 tons of petroleum products. Owned by the Ashland Oil and Refining Company, she boasts General Motors Model 278A diesels for a total of 4800 hp.



View of the Mississippi River lock and dam No. 11. Photo was taken from Eagle Point Rock.

is the Columbia River. It enables ocean vessels to reach Portland, Ore., and Vancouver, Wash. This deep channel extends to the Bonneville Dam, and a shallower channel goes on to Pasco, Wash. In all, 1200 miles of river channel open world markets to the rich forest and agricultural products of the Northwest's Inland Empire.

The inland waterway system is far from being all that it one day will be. Extensions and improvements are currently in progress throughout the country, and still others are being planned. A few examples will suffice to indicate the scope of these improvements and visions. The Allegheny River Improvement Association has in mind the linking of the New York Barge Canal with the Ohio-Mississippi system. On the Ohio, new and bigger locks and dams are gradually reducing the number of time-consuming lockings necessary to traverse this stream during periods of low-water. In the Northwest, an aggressive association is working for full exploration of the Columbia-Snake rivers system. Construction of the John Day dam on the Columbia, and of Ice Harbor, Little Goose and other dams on the Snake will carry this aspiration far along its way.

What are the products of America that provide so

OHIO RIVER & TRIBUTARIES

Barge traffic for full year of 1954 as computed by Army Corps of Engineers.

RIVER	1954 TONNAGES
Ohio	55,076,677
Monongahela	28,937,364
Tennessee	8,415,769
Kanawha	6,369,016
Allegheny (improved portion)	3,773,074
Cumberland	2,233,088
Green and Barren	206,625
Kentuckey	132,294
Youghiogheny	119,428
French Broad and Little Pigeon	99,040
Little Kanawha	62,574
Muskingum	55,120
Hiwassee	53,881
Big Sandy	17,292

much work for diesels on the waterways? An accompanying-table lists the heavy-volume products and indicates their relative standing. While the freight handled is extremely diversified, in the main it is bulk commodities such as coal, grain, rock products and petroleum. Also, river commerce lends itself to heavy, mass-produced manufactured goods such as finished steel, automobiles, and building materials.

As the country has grown, so have the tonnage figures expanded on all inland waters. On the Mississippi, for example, from the Mouth of the Passes (about 100 miles south of New Orleans) to Minneapolis, tonnage has doubled in the last 10 years. In 1945 it was 43,968,841 while in 1954 it had grown to 82,404,001 with an even higher figure indicated when the 1955 tally is completed. The

MISSISSIPPI RIVER

Comparative statement of traffic by years, 1945 to 1954, inclusive, hauled on the Mississippi River (Mineapolis to Mouth of Passes).

Year	Vessel Traffic Tons	Rafted Tons	Total Tons
1945	43,903,195	65,646	43,968,841
1946	41,223,913	84,562	41,308,475
1947	51,282,048	144,516	51,426,564
1948	57,027,800	120,468	47,148,268
1949	59,268,468	54,440	59,322,908
1950	66,825,030	97,564	66,922,594
1951	72,434,939	75,751	72,510,690
1952	77,500,111	84,445	77,584,556
1953	80,054,057	45,852	80,099,909
1954	82,352,657	51,344	82,404,001
Total ton/miles 1954		24,783,308,070	
Total ton/miles 1945		8,710,185,251	

PRINCIPAL COMMODITIES HANDLED 1954

Petroleum products	over	30,000,000 Tons
Sand, gravel & crushed rock	over	4,700,000 Tons
Steel and iron products	over	3,500,000 Tons
Coal	over	3,000,000 Tons
Grains	over	2,000,000 Tons
Sulphur	over	1,645,000 Tons
Seashells (crude)	over	1,359,000 Tons
Waterways improvement materials	over	1,350,000 Tons
Industrial chemicals	over	832,000 Tons
Sugar	over	424,000 Tons

Motor vessel *Commercial Express* downbound in Louisville and Portland Canal with 487 automobiles. Fairbanks-Morse diesels for a total of 3000 hp power the 525-foot vessels. She is owned by Commercial Barge Lines.

Missouri showed 45,000 tons in 1952, 287,000 in 1954 and 362,000 in the first eight months of 1955 despite a 3-week closure. The Columbia River carried 13,427 tons back in 1897; 1,401,881 in 1945 and for the first eight months of 1955, 2,403,902 tons.

Authorities on the subject say there will be an even more rapid rate of growth, and they give sound reasons for their belief. They say that the narrower margin of profit in highly competitive industries encourages manufacturers to turn to low-cost water transportation. This advantage has led numerous industries to locate main plants and branches along the waterways. Also many mass-distribution warehouses, power plants and refineries have been building adjacent to inland transportation. Increasing rail-water cooperation has resulted in building additional and expanded terminal facilities along the rivers. Not only do all these new industries create direct tonnage for the diesel-driven craft that ply the waterways, but they also stimulate even more business indirectly by giving increased employment. The growing populations of the river cities need more coal, autos, building materials—a happy, prosperous cycle that inspires confidence among rivermen.

Still other reasons for anticipating further growth

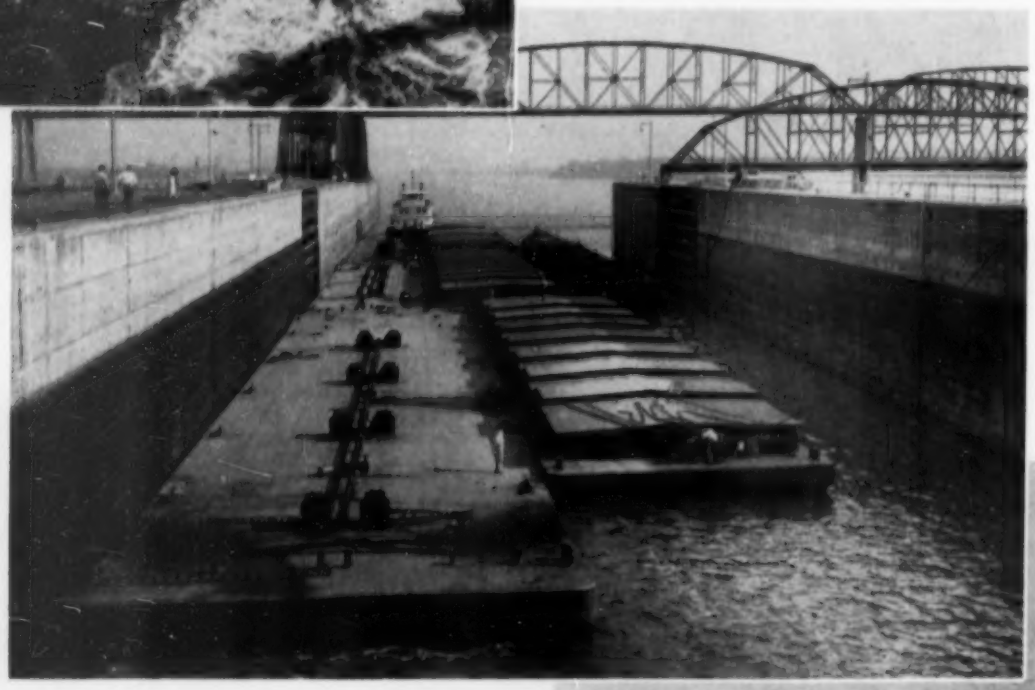
The *Ernest T. Weir* downbound at Louisville with a mixed tow. Superior 8-cyl. engines rated 1300 hp at 277 rpm power the craft. She is owned by Mississippi Valley Barge Lines.

in river traffic are cited. The towboat situation itself is favorable, and getting more so. The modernization of the old steam-powered workhorses already has been mentioned. We also have spoken of the trend to greater horsepower, manueverability, and efficiency. Diesels and other modern machinery, accessories and designs make it possible to keep up with the demand for speed and economy. Also, there has been continued improvement in barge construction. Specialty barges are built today to handle hot caustic, chemicals, paper materials, automobiles and other goods that must be transported with care.

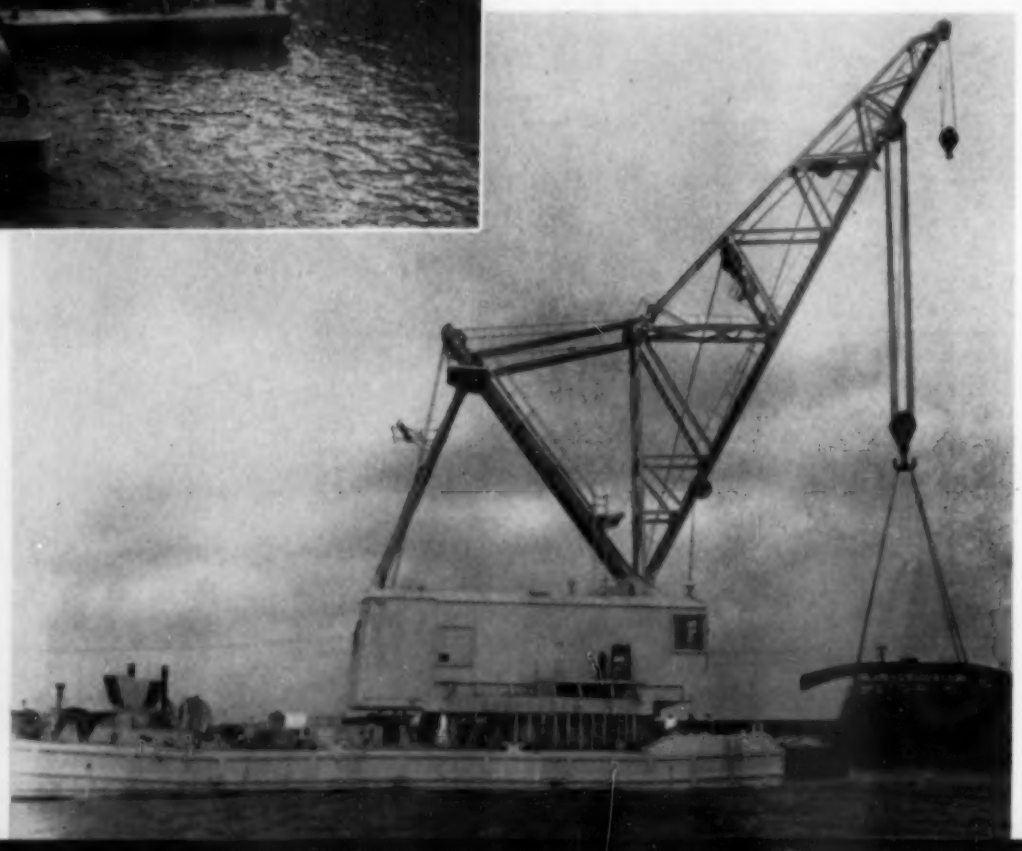
Today's inland fleets are the largest they have ever been in history—both as to numbers and in cargo-carrying capacity. Many new towboats, barges, tugs and channel maintenance vessels are under construction or being planned.

And this leads us to the shipbuilding industry itself. This is a basic industry of some importance along the inland waterways. These yards boost tonnage and employment in their areas. Their skilled workers install the diesel engines and overhaul them. The shipyards are a good market for manufacturers within the diesel industry, and the diesel industry is a benefactor of the shipyards, having contributed greatly to the Waterway's resurgence.

The towboat *Arnold V. Walker* with two barges of miscellaneous freight, two barges of sulphur and two empties passing through the Chain of Rocks Canal. GM engines deliver 1800 hp. She is owned by A. L. Mechling Barge Lines.



The *Bernard V. Walker* with three barges of petroleum products, three of mixed freight and two empty barges entering Lock and Dam 26 at Alton, Illinois on a voyage up the Mississippi.



Government equipment powered by diesels is a common sight on the inland waterways. Here, a diesel-electric crane is powered by two Enterprise engines. This 100-ton crane is owned by the Army.

COLUMBIA RIVER

Comparative tonnage handled on Columbia River from 1897 through first eight months of 1955.

Year	Bonneville Lock (Cascade Locks prior to 1938)	The Dalles-Celilo Canal	McNary Lock	Annual Total
1897-1900 (yearly av.)	13,427			13,427
1901-1910 (yearly av.)	32,006			32,006
1911-1920 (yearly av.)	33,807	4,020†		37,827
1925	5,913	75		5,988
1930	79,747	0		79,747
1935	67,527	3,631		71,158
1940	707,444	325,900		1,033,344
1945	802,901	598,980		1,401,881
1950	1,158,627	848,148		2,006,775
1951	1,374,879	1,016,741	413,615 (lock opened)	2,805,235
1952	1,524,408	1,023,212	489,701	3,037,321
1953*	1,344,302	782,446	404,593	2,531,341
1954	1,377,819	798,220	521,426	2,697,465
1955**	1,188,871	738,915	476,116	2,403,902

* Reduction in 1953 tonnage resulted from closure for McNary Locks for 142 days during the year for completion of construction. This closure affected upbound and downbound tonnage through Bonneville Locks and The Dalles-Celilo Canal, since a portion of this tonnage was destined for points upstream from McNary Dam.

**First 8 months of 1955 only.

† (canal completed 1915)

Close-up view of the Harbormaster powered sugar barges which have cut the travel time in the plantation-to-shipping docks run from 1 hours to 2 hours. The unit mounts a Hercules diesel, Model O-42H.

BRITISH GUIANA SUGAR BARGES

FOR a great many years it has been the practice of the great sugar estates in British Guiana to transport their sugar from the refinery on the estates to the shipping docks in Georgetown by sailing punts. These sailing barges were about 65 ft. long and carried about 35 tons of bagged sugar. They were, however, wholly dependent on the vagaries of wind and tide. A run of ten miles either way often took them 24 hours. They were so difficult to maneuver in close quarters that when several large ships were tied up at the docks it was almost an impossibility to get between them and up to the dock.

On the plantation end of the run there was more trouble. First, the sail had to be removed from the mast and the mast lowered to enable the barge to proceed into and to traverse the canal system. It was also necessary to hit the first water gate between the ocean and the canal system at the exact time the height of the ocean water was that of the canal system. Otherwise they lose too much fresh water from the canals or take in too much ocean water when the gate is opened.

After many years of frustration the firm of Sandbach and Parker decided to try out powered sugar barges. Sprostons Limited of Georgetown designed and built the maximum size barge that could be used in the canals. It is 73¾ in. long, a beam of 10 ft. and a depth of 5 ft. 3 in. The cargo hold, 2800 cubic feet, carries 62.38 tons of sugar in bags. The power is supplied by a Murray & Tregurtha "Harbormaster" model 0-42H. This unit will drive the barge about 7½ smph light, and 5 smph when fully loaded. The trip down the river from Georgetown to the mouth, then along the coast to the sugar plantation is a matter of ten or twelve miles.

The trip out light takes from one hour and fifteen minutes to one and one half hours. Back, loaded with sixty tons of sugar, the trip is done in two hours. It is no longer a guessing game as to when the barge is to arrive at the first gate, they know within five minutes.

The "Harbormaster" model 0-42H is powered with a Hercules diesel model DIX-4-D.

The 73 ft. long barge is capable of holding 62.38 tons of sugar in bags as against the 35 tons carried by the old, slow moving sailing barges.

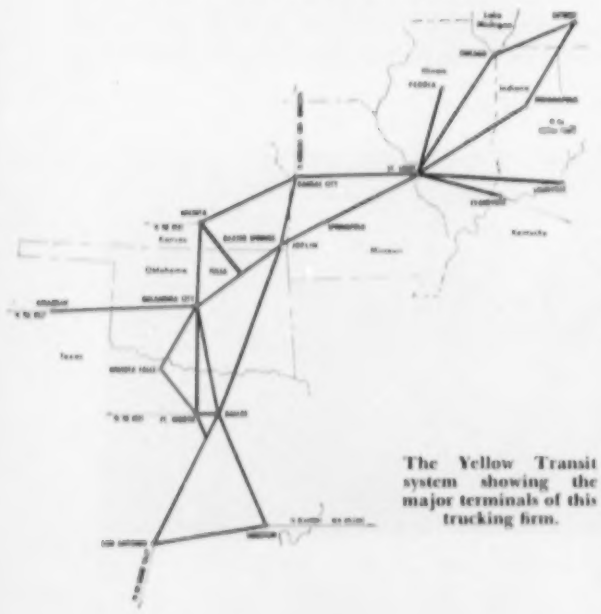
The purchase of 200 Kenworth CBE tractors with Cummins turbo-diesels and 400 aluminum trailers in a complete change from gasoline to diesel represents one of the largest single orders for equipment in the trucking industry. *Top.* Fuel tanks are easily filled and oil dipstick is only an arm length away in the CBE tractor.

YELLOW TRANSIT GOES ALL DIESEL

A Leading Mid-West Trucker Switches Operation To Complete Diesel, Consolidates Maintenance And Repair Facilities and Comes Up With High Operating Economy

By L. H. HOUCK

TWO hundred modern diesel tractors, replacing 250 gas units, in a complete diesel transition at Yellow Transit Freight Lines, are now pulling 30 per cent greater loads in continuous runs from the Gulf to the Great Lakes with only driver changes. Such straight-through runs speed freight as much as 20 per cent and was adopted by the line at the time of the changeover because of the dependability of the diesel. This fresh approach to profitable freight movement with newly designed Kenworth cab-beside-engine tractors, provides 12 percent greater load potentials, and the 175-hp, 6-cyl. Cummins JT-6-B turbo-diesels, pull 48,000-pound GVW loads at 7 miles per gallon.



The Yellow Transit system showing the major terminals of this trucking firm.

Changing to full diesel operation over the 8,435-mile system at one stroke, resulted in one of the largest equipment purchases in the trucking industry, and according to George E. Powell, Sr., president, immediately resulted in numerous maintenance and operating economies in addition to increased payloads and faster freight service for Yellow Transit's customers.

Horsepower at the wheels, goal of every truck line operator, and decidedly different from theoretical or brake horsepower, went up more than 40 per cent, according to W. R. (Bill) Riley, energetic automotive engineer and fleet superintendent, who said the new tractors deliver an average of 134 hp at the wheels in comparison with 80 to 90 hp with the old units. He said the turbocharging provided a flexibility and power response not found in naturally aspirated engines. Another important dividend resulting from the system-wide change to diesel, Riley said, was the opportunity to consolidate 8 scattered maintenance shops in one well equipped shop operation. This led to the establishment of the main shop at Baxter Springs, Kansas, where it is the largest business in town. This is the halfway point between Dallas and St. Louis and a driver-change station in the newly inaugurated system of driving equipment straight through to its final destination.

When completed this shop will provide engine overhaul and rebuild equipment, unit rebuild, injector service, body, brake, tire and paint departments. Most small units will be rebuilt here and stocked at maintenance and service terminals for replacement when needed. This will provide complete equipment for rebuilding generators, injectors, pump assemblies and other small units. A heavy duty frame and front end machine has already been installed and all equipment will get front end alignment and frame checks here as a part of a new preventive maintenance system being established by the trucker.

"With one large shop doing most of the expensive and important work we can feel more free to provide a full range of modern equipment," Bill Riley

said, "and the investment in such shop equipment will be sizeable." Riley said that the consolidation of the shops have led to savings in manpower and improvement in efficiency plus the elimination of buying duplicate equipment for a number of shops. While service and refueling shops will be maintained at virtually all terminals, overhauls and repairs will be concentrated at Baxter Springs.

Another bugaboo that continually faces the fleet owner who looks invitingly at diesels to replace gasoline equipment, has been laid low. It is a common saying that gas drivers can't or won't drive diesels and that new drivers and expensive training schools are a bothersome feature of such a change.

Driver transition at Yellow Transit was accomplished with record smoothness, with personnel and terminal managers turning in continuing reports of pleased and enthusiastic drivers, who have suddenly discovered they can handle bigger loads with less work and with better visibility, and that turbocharged engines are more flexible in heavy traffic, with faster schedules possible over the road and less shifting on hills. One driver in particular who had said he didn't like diesels, became a particularly enthusiastic convert. He came to Bill Riley and said: "I don't care what anybody else says, I like 'em. They've taken the hills out of my run and my workday is like a breeze."

The new diesel units ended another complaint, according to George E. Powell, Jr., vice-president in charge of operations, who said: "Drivers who used to complain when they had 34,000-pound loads now take 44,000 and ask for more."

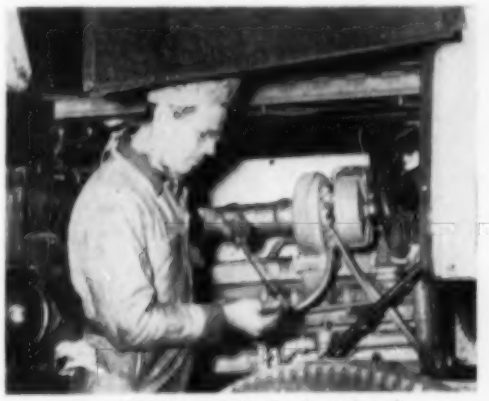
The Kenworth CBE tractor has a business-like appearance, with its locomotive type cab 95 inches above the axle, reached by a hand-hold and a railroad type step-iron, which keeps unauthorized personnel off and eliminates running board and projections. The driver's door does not swing when open but locks in open position until closed by the driver. Wheelbase is 138 inches. A 2-speed rear axle has a ratio of 5.62-to-1 and 7.21-to-1; a Fuller 5-A-65 transmission provides 5 speeds; tires are 10:00 x 20 tubeless. Weight is 8,900 pounds empty, 9,800 pounds with fuel and 200-lb. driver.

Yellow Transit's rise to one of the large and successful motor freight operations of the country, is a phenomenal tribute to good management. George E. Powell, Sr., with a group of Middle West investors, bought the line in 1951 after it had reached bottom in 1951 with worn-out equipment and a large indebtedness. Mr. Powell had a career behind him of 19 years in metropolitan banking and experience as vice-president of Riss & Co., another nationally known freight line with headquarters in Kansas City. He moved Yellow Transit headquarters to Kansas City and soon turned the multitudes of red figures into a more pleasing shade of black.

Yellow Transit's mileage in 1954 was 16,435,725 and gross revenue was $8,744,241 and the company handled 532,686,000 pounds of freight representing 518,824 shipments. It has 850 employees and a payroll of $4,500,000. It operates in 9 states—Michigan, Illinois, Oklahoma, Indiana, Missouri, Kentucky, Kansas and Texas. Terminals are located in all principal cities in the territory.

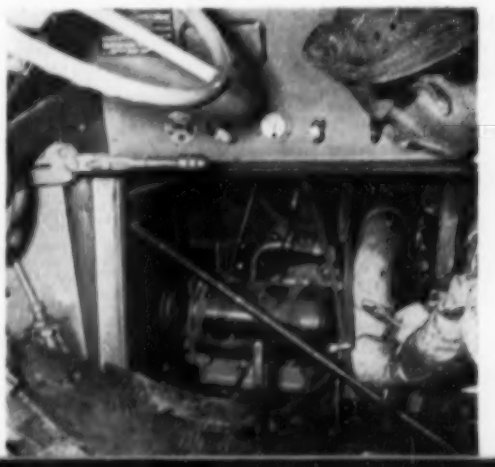
"We have started a system-wide drive to provide the finest freight service available," George E. Powell, Sr., told DIESEL PROGRESS, "and the replacement of our 5-year-old gas fleet with these new 200 modern diesels and 400 Fruehauf aluminum trailers is the first step forward that has already affected numerous economies and improvements in new and faster service."

W. H. Riley, maintenance superintendent (left), George E. Powell, Jr., vice president in charge of operations, and George E. Powell, Sr., president of Yellow Transit Freight Lines, Inc.

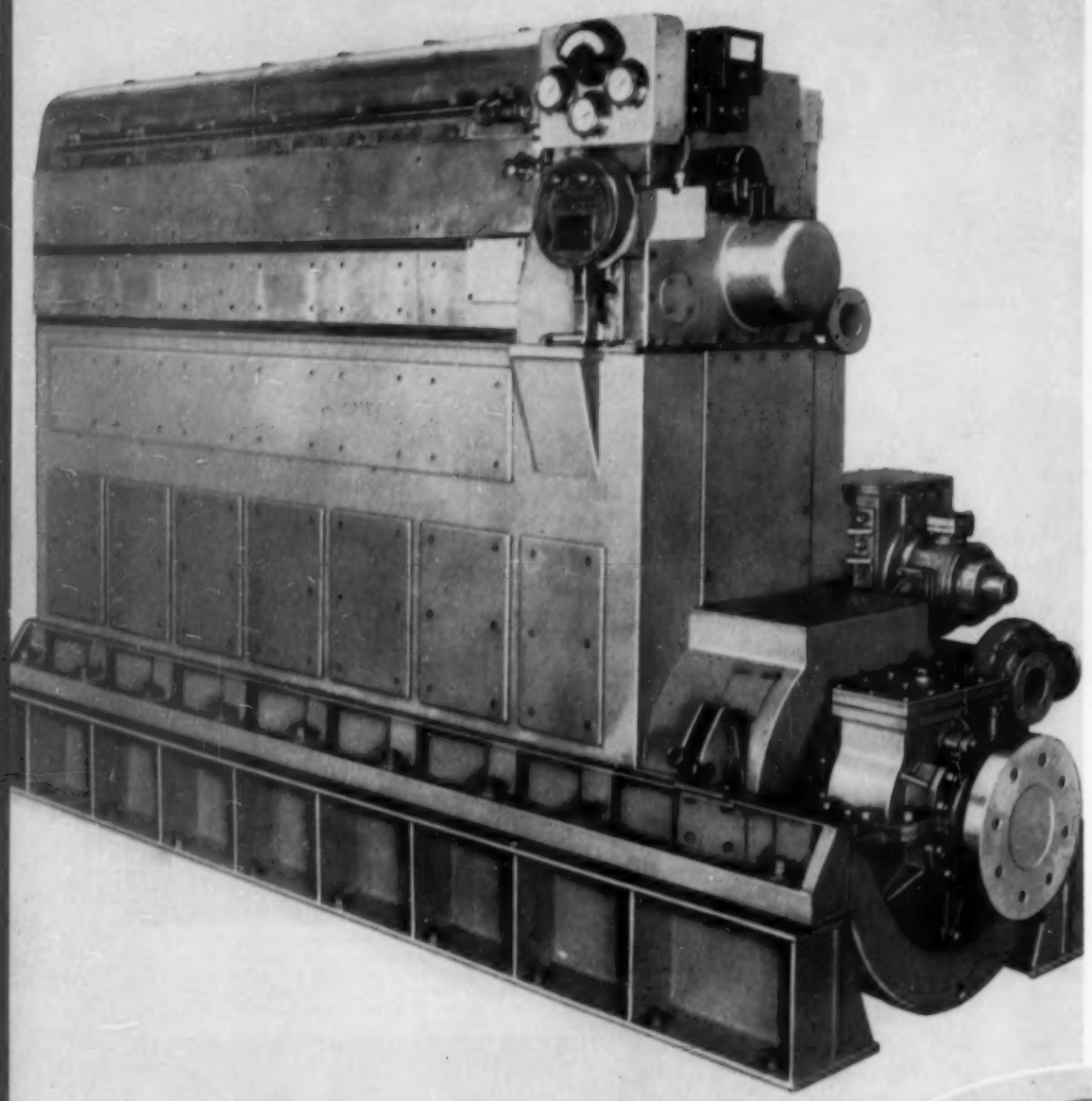


The Cummins turbodiesel engine is serviced from the right side. Lead mechanic Wilbur Reynolds, 13 years with Yellow Transit, checks the oil level.

Door in right side of cab provides access to left side of engine. Gear and brake levers slip on square shanks protruding from cab floor.



KAHLENBERG S



THE Kahlenberg Model E is a vertical, heavy-duty, full diesel, direct injection, two-stroke cycle engine employing uniflow scavenging and pulse system exhaust turbocharging. It starts and operates in either direction of rotation throughout its entire speed range without a scavenge pump, blower, or any other device to assist the turbocharger. It idles at speeds as low as 100 rpm.

Neat and compact in design, this diesel is intended for general service in a variety of fields. For marine work it is suitable for use as a direct-drive, direct reversible unit. Reduction gears can be adapted for extremely low propeller as well as multiple engine geared drives. Illustrations show a six-cylinder engine of this type which has been under continuous development for over six years. It has a bore of 10½ in. and stroke of 16 in.

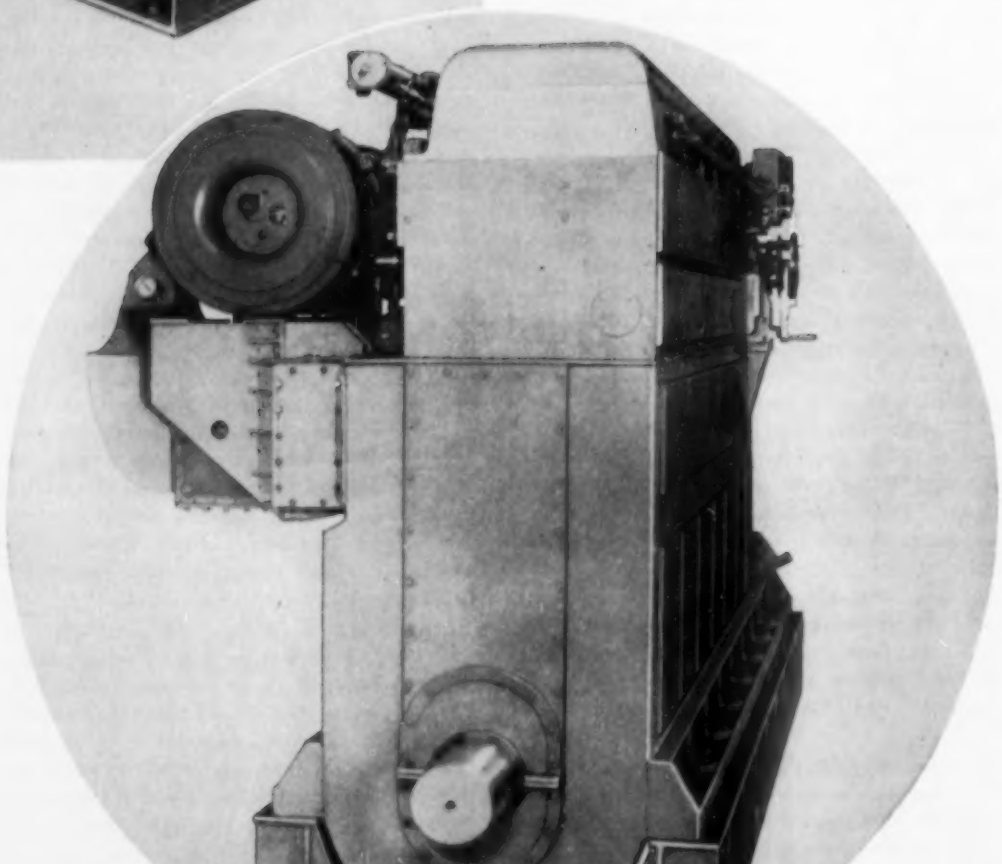
Tests at 300 to 400 rpm and 100 psi have shown a very flat fuel curve with excellent operating characteristics and good combustion, according to the builder. Average specific fuel consumption of .380 pounds per bhp/hr is obtained while driving all auxiliaries, including sea water and jacket water

View of the Kahlenberg Model E full diesel. It starts and operates in either direction of rotation throughout its entire range without scavenge pump, blower or any other device to assist the turbocharger. Note the clean design of the engine.

Editor's Note:

Another milestone has been passed in the development of diesel engines with the announcement by Kahlenberg Bros. Co., Two Rivers, Wisconsin, of the first self-sustained turbocharged two-stroke cycle diesel in the United States. It may be that this American pioneer in the building of internal combustion engines is the first in the world to achieve such operation in a two-stroke cycle diesel engine of under 12-in. bore.

Watching the performance of this new engine on the test stand, this writer was impressed by its ease of starting, its quick response and acceleration qualities, its good idling characteristics, and its clean exhaust, even when accelerating. The Kahlenberg organization is to be congratulated on its achievement and the advanced design features of its new engine.



The Napier turbocharger and the intercooler can be seen to the left in this view of the Kahlenberg engine. The Weston tachometer is on the instrument board at the right end.

G SELF-SUSTAINED TURBOCHARGED DIESEL

pumps. Piston speed of only 1066 feet per minute at 400 rpm is indicative of long life.

Turbocharging is on the pulse system using Napier exhaust turbocharger as manufactured by D. Napier and Son, Ltd. of England. (See DIESEL PROGRESS for May, 1955 page 64, and page 261 of Volume 20 DIESEL ENGINE CATALOG for detailed description of the Napier turbocharger.) Napier cooperated in matching the turbocharger to the engine. Sectionalized dry-type exhaust manifolding, fully streamlined, is provided with lagging so arranged that the manifold is removable without disturbing the lagging. The manifolding is designed so that there is a minimum time lag of exhaust gases travelling from cylinders to the turbocharger. In the six cylinder engine there are two openings in the turbocharger exhaust gas inlet chamber, with a three-cylinder bank manifolding connected to each opening. A large area intercooler is employed between turbocharger and engine airbox, bringing the engine inlet air to reduced temperature for greater power output.

Welded frame construction is used, resulting in greatly reduced weight for a low rpm heavy-duty engine. Crankshaft and bearings are bedded in the engine frame and all bearings are accessible through crankcase doors without removing the engine from its foundation. Crankcase doors are of aluminum with special latches for easy removal.

The steel frame is U-type, one-piece design with through-bolt stress members. The base runs the full length of the engine to coupling, and for marine service a separate adjustable type thrust bearing is mounted inside the engine base between flywheel and coupling.

The crankshaft is machined from a solid steel forging and is drilled for lubrication. Flywheel flange is at the drive end of the crankshaft. Main bearings consist of lined steel shells and backs rigidly supported in the base. Full flow pressure lubrication is employed throughout. Crankpin bearings are two-piece marine type with removable bronze back shells fully interchangeable. Removable individual cast iron cylinder jackets are used with wet-type, removable liners of special analysis iron, which are completely machined, accurately ported and sealed. Water jacket connections are through flanged jumpers.

Pistons, which are oil-cooled, are of special iron thoroughly annealed and ground. The pistons, with rods, are removable through the crankcase doors, thus making it unnecessary to remove cylinder heads, valve gear and associated parts to take out the pistons, although this can be done if desired. The piston pin is semi-floating type, clamped in the eye of the connecting rod, floating in two bronze pin bushings. Connecting rods and piston pins are especially drilled for full flow oil cooling of the piston. The connecting rods are fully machined steel forgings.

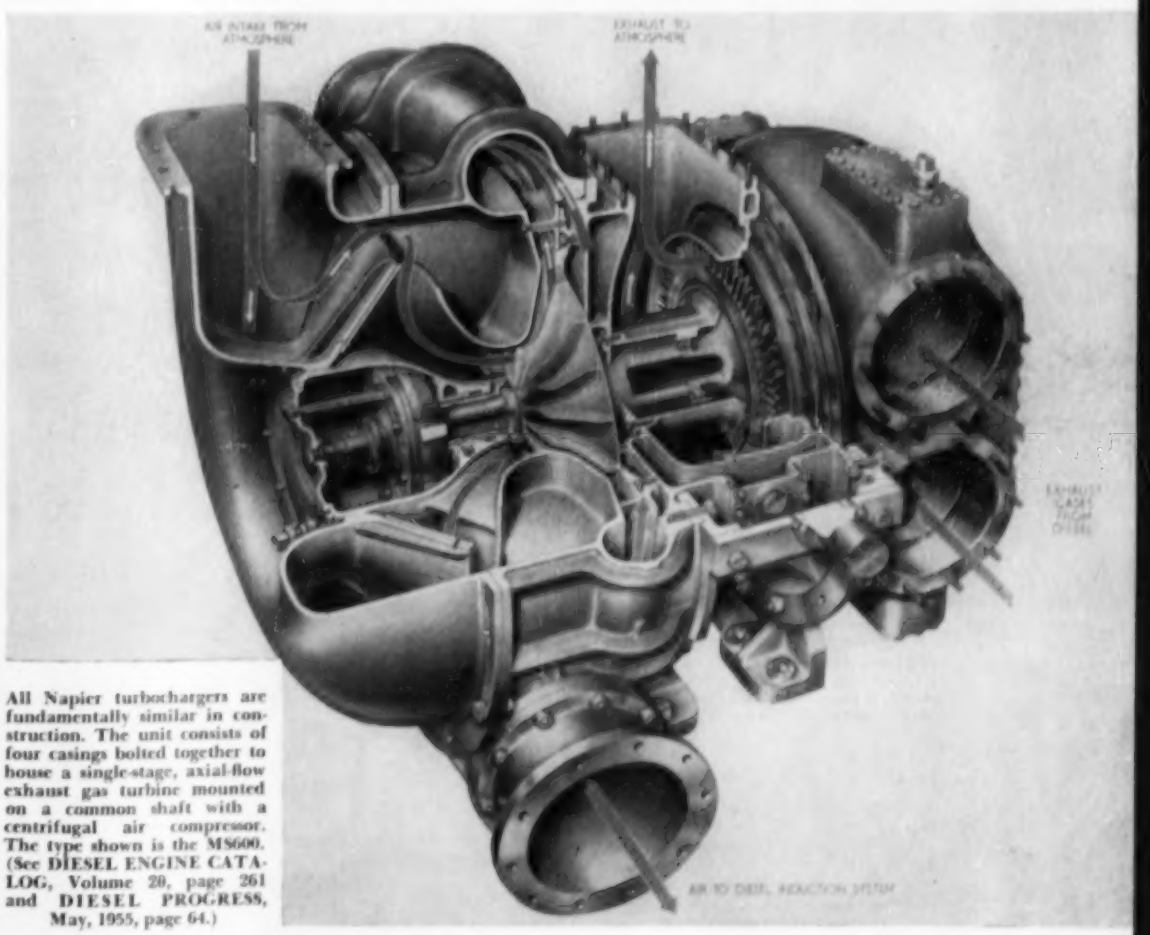
A one-piece camshaft, removable as a unit without disturbing the camshaft drive, is driven from the crankshaft by a multiple roller chain, as are the scavenging and pressure lube oil pumps, fuel transfer pump and centrifugal jacket and sea water pumps. Each individual cylinder head has two exhaust valves in water-cooled cages, a fuel injection nozzle and a caged poppet type air inlet valve. Valve operating gear is entirely pressure lubricated. A special valve shield is provided, making it impossible for an exhaust valve to drop into the cylinder under any circumstances. Valve gear covers are made of cast aluminum for lightness and ease of handling.

Fuel pumps are individual type and are mounted in a gallery immediately above the cambox and adjacent to the cylinder heads, thus utilizing extremely short injection tubes of equal length. Racks are interlocked to a common governor control rod. Governor is either centrifugal or hydraulic type.

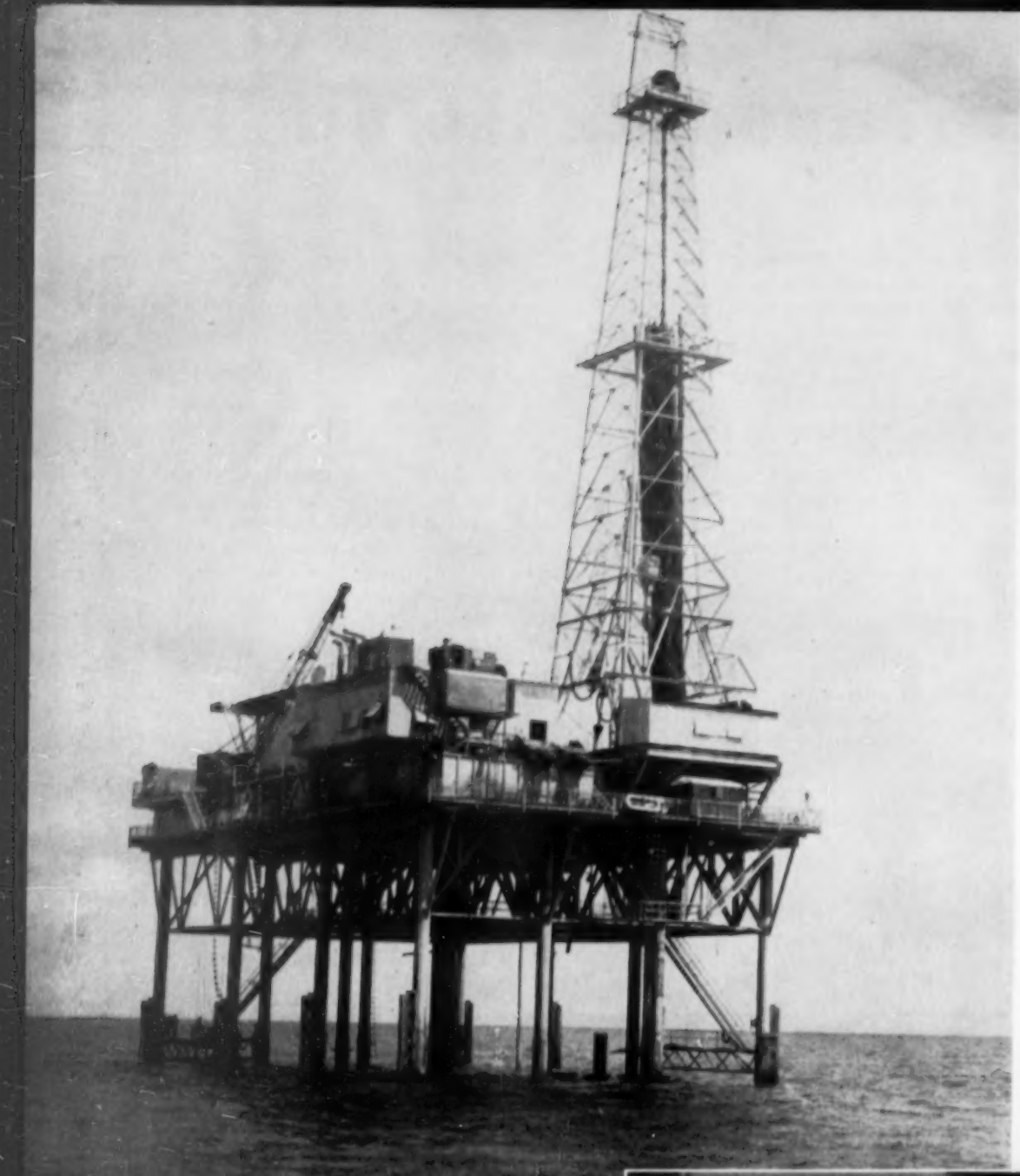
A closed cooling system is employed for marine service. Two interchangeable reversible centrifugal pumps are built in on the auxiliary drive case and are driven from the same shaft as the lube oil pumps. One centrifugal circulates the engine jacket water; and where "skin cooling" is employed, just this one pump need be supplied. Or, if preferred, a separate motor-driven jacket water pump may be substituted. When shell and tube type heat exchanger is used, the two built-in centrifugals can be used or separate motor driven pumps can be supplied instead. A thermostatic by-pass valve is used to maintain constant engine jacket water temperature.

Control of the engine is centralized in a single lever near the aft end. For marine use, a movable camshaft is employed with a full set of cams for each cylinder, both for ahead and astern operation. The camshaft is shifted by a built-in air cylinder interlocked with the engine control lever. Starting air at 250 psi is automatically shut off as soon as the engine begins operating. The position of the camshaft is shown by a special mechanical indicator on the control housing, and can be extended electrically for remote control. The engine can be started, stopped, reversed and speed controlled from the usual engine station or from a remote position such as engine room platform or pilot house. Tests show the engine maneuvers rapidly for marine service with quick acceleration. A feature of this operation is the extremely small volume of air required in reversing, making extensive air storage capacity unnecessary.

The Kahlenberg Model E engines are offered in four, five, six, seven and eight cylinder units, with deliveries beginning in the spring of 1956. Horsepower ratings presently are based on a bmep of 95 psi, giving a power output range from 100 to 133 bhp per cylinder at speeds from 300 to 400 rpm, with overload capacity in reserve.



All Napier turbochargers are fundamentally similar in construction. The unit consists of four casings bolted together to house a single-stage, axial-flow exhaust gas turbine mounted on a common shaft with a centrifugal air compressor. The type shown is the MS600. (See DIESEL ENGINE CATALOG, Volume 20, page 261 and DIESEL PROGRESS, May, 1955, page 64.)

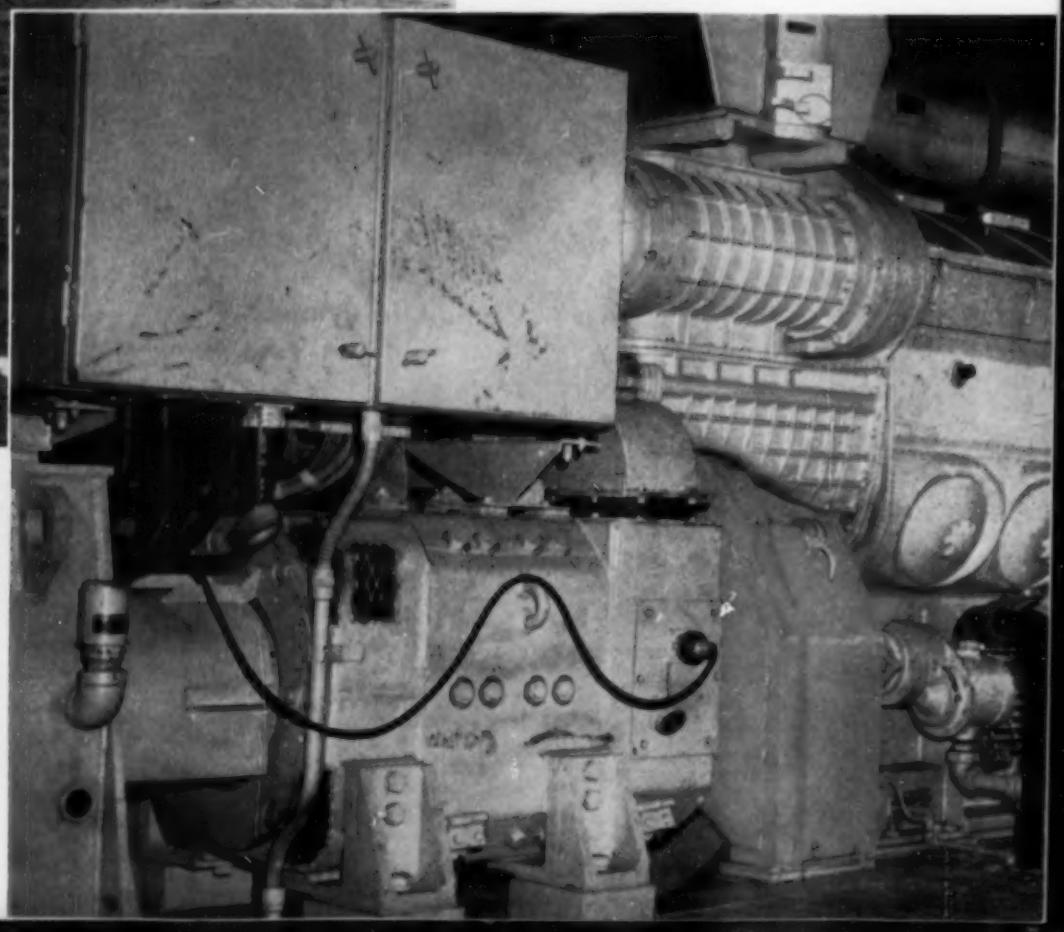


FIRST ELECTRO-MOTIVE UNITS DRILL OFFSHORE HOLE

1750-hp Diesel-Electric System Utilized by Phillips Petroleum Company in Gulf of Mexico, 35 Miles Off The Louisiana Coast

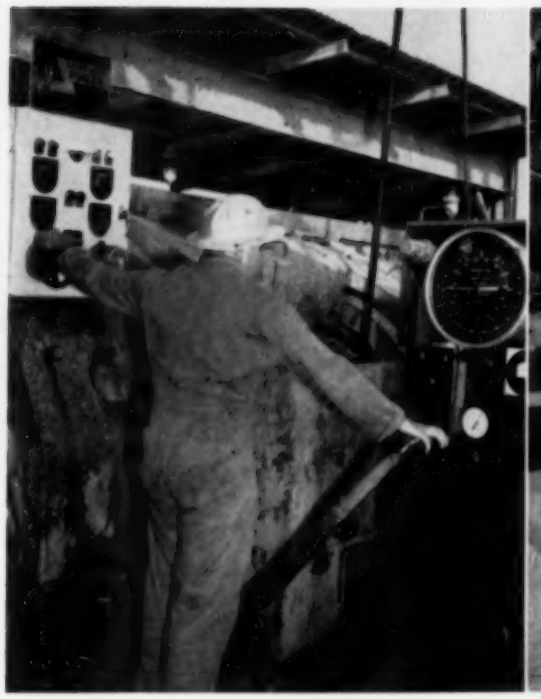
THE first Electro-Motive power units to make hole from an offshore drilling rig are working for the Phillips Petroleum Co., according to N. C. Dezendorf, vice president of General Motors and general manager of the Electro-Motive Division. The platform is located in the Gulf of Mexico 35 miles from the Louisiana shore. The well was spudded in August.

The 1750-hp power system is comprised of two GM 567C V-8 diesel engines of 8½ in. bore and 10 in. stroke. The generator sets are Model SR-8

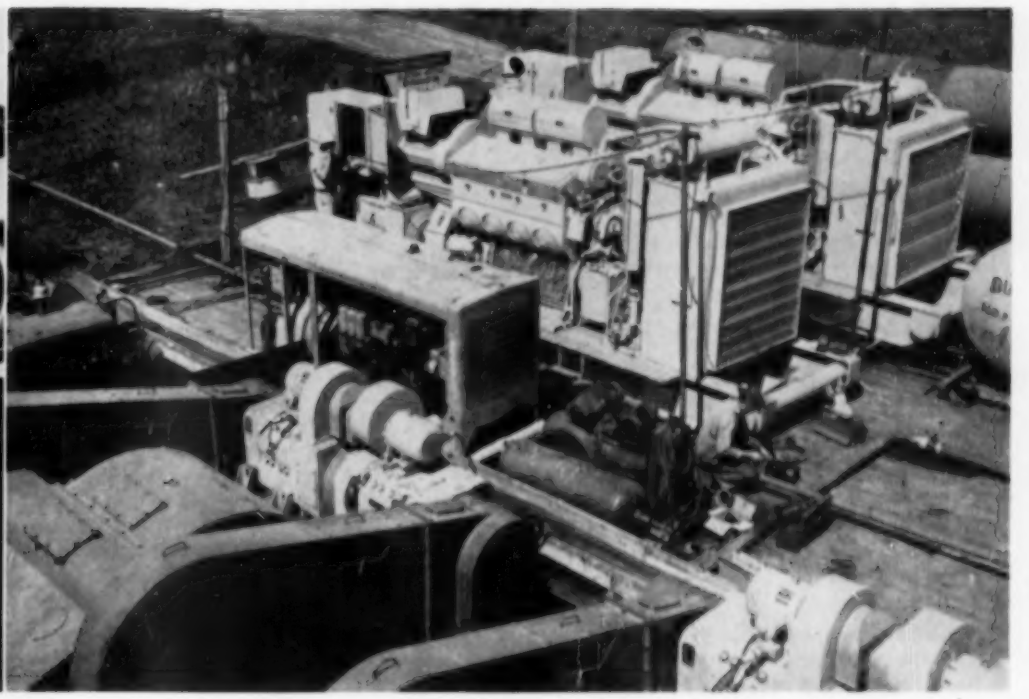


Thirty-five miles out in the Gulf of Mexico from the Louisiana shore this platform-type drilling rig is making hole for the Phillips Petroleum Co. Its power is provided by a 1750-hp Electro-Motive diesel-electric system. The crane shown is a Marion.

At right is one of two 875-hp diesel-electric units, built by Electro-Motive Division of General Motors, which provide power to operate the big Phillips rig. M. J. Johnson, tool pusher of Abbeville, La., is shown checking gauges.



Driller C. Reeves, Franklin, La., is shown at the controls of the first offshore rig to be equipped with Electro-Motive power units. The diesels are basically the same as those that won a reputation in railroad locomotives.



The Electro-Motive power units shown above were being readied for installation on a land drilling rig of the Offshore Co., Houma, La. They are identical to those on the Phillips offshore rig. They drilled to 12,000 ft. on their first hole and now are working on a second location.

General Motors units. These diesel-electric power units are identical with two 8-cylinder sets used on a land rig of the Offshore Co., Houma, La. (See August 1955 DIESEL PROGRESS, pages 37-39). Offshore is using this machinery at present to drill a second hole, – in a lake near Allemands, La.

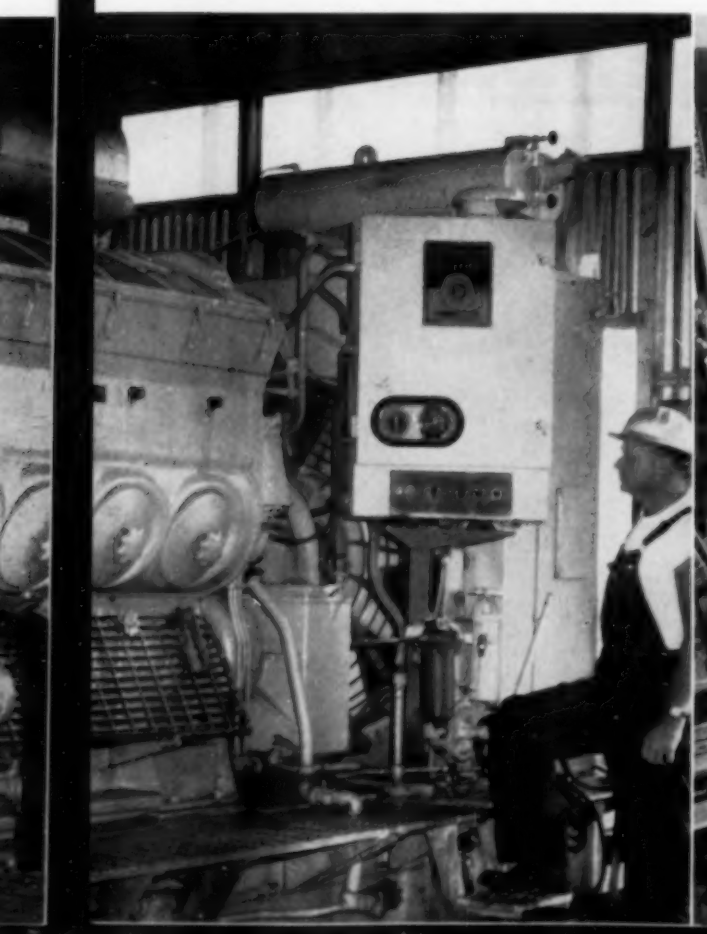
"The Electro-Motive power on the Phillips rig enabled that company to save several hundred square feet of high-cost platform space that would have been necessary in a diesel-mechanical rig," Mr. Dezendorf pointed out. "The diesel-electric generating units were placed on the platform without regard to any alignment with drawworks, rotary table or mud pumps such as would have been required in a mechanical type rig."

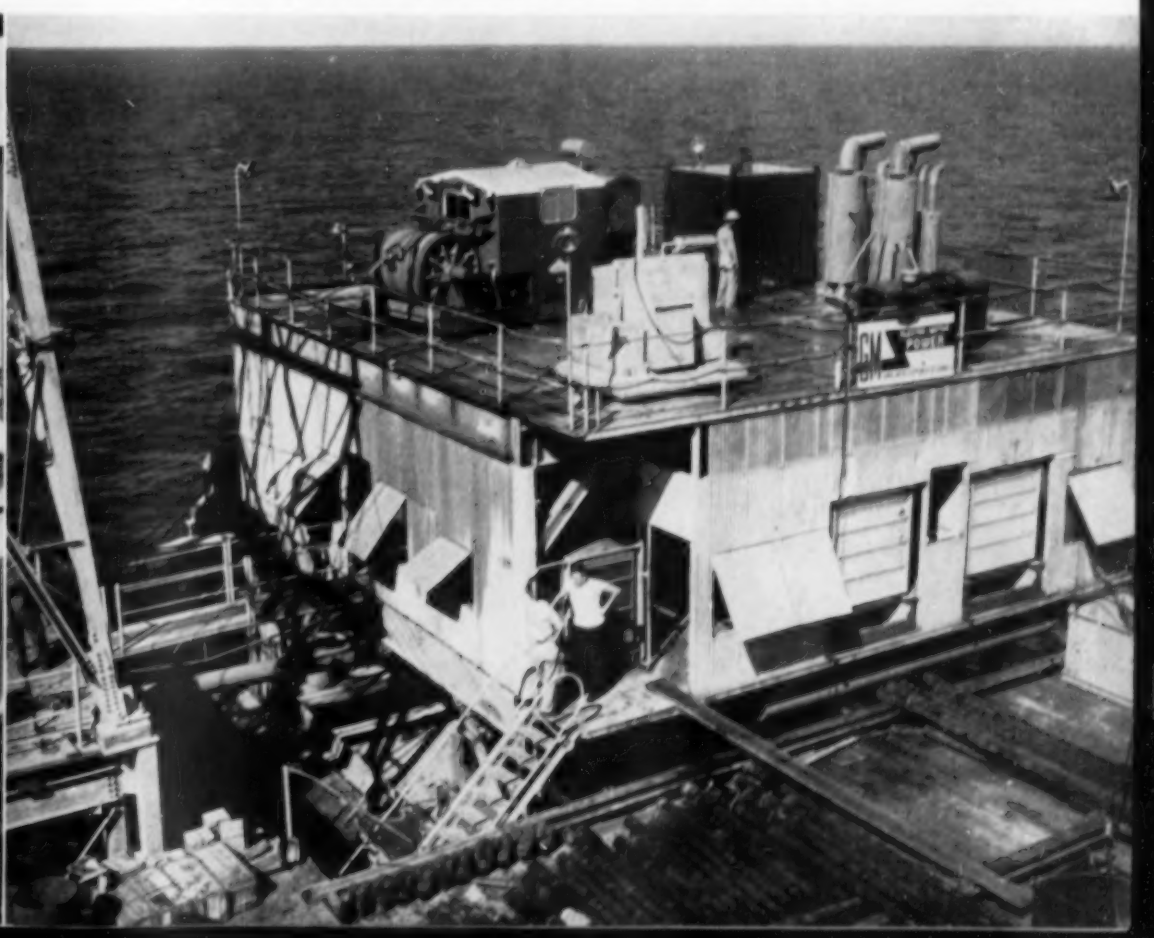
Flexible electric cable from the basic generating units are connected to seven Electro-Motive motors on the rig which supply power for the rotary table, drawworks, and the two mud pumps. The drawworks—now powered by two Electro-Motive 625-hp direct current motors—is a steam-type.

Each of the 875-hp engines has a displacement of 1536, piston speed of 1390 ft. per min., continuous torque of 5500 ft. lb., and compression ratio of 16:1. On each engine are two 500-hp generators, mounted side by side on the common engine subbase. The exciter is driven from a power take-off.

The generators actually are traction motors with extra fields wound into them. These two units supply the entire power needs of the operation.

Housed in this building on the Phillips platform, two 8-cylinder V engines supply electric power for seven motors to run the drawworks, rotary table and mud pumps.





WHITE ANNOUNCES NEW LINE OF DIESEL ENGINES

Editor's Note

The new White V-106 diesel engine was announced at the Society of Automotive Engineers Golden Anniversary Diesel Engine meeting in St. Louis. To achieve their objectives of extreme simplicity in design and light weight, the White Diesel Engine Division of The White Motor Co. obtained licenses for European patents and assimilated some features of these engines into their own design. The engine is a two-cycle loop scavenged engine with no valves, valve gear or camshaft. An eight-cylinder model will be added to the four-and six-cylinder models now being produced. Turning at 2200 rpm, the 4-cyl. is rated at 170 hp, the 6-cyl. at 255 hp. This paper was given November 3, 1955.

In designing the new White diesel, every effort was made to create an engine with a minimum number of parts which an average mechanic could overhaul without the need of special tools. For example, one man can remove a cylinder assembly by loosening four studs which hold it to the block. Another feature is the centrifugal-type scavenging blower, mounted in the engine, just back of the fan drive.

The remainder of this article is extracted from the paper by W. F. Burrows and H. W. Hanners, delivered at the SAE meeting. Mr. Burrows is general manager of the White Engine Division, and Mr. Hanners is Research Engineer. The title of their SAE paper is "Design and Development Experience —White V106 Diesel".

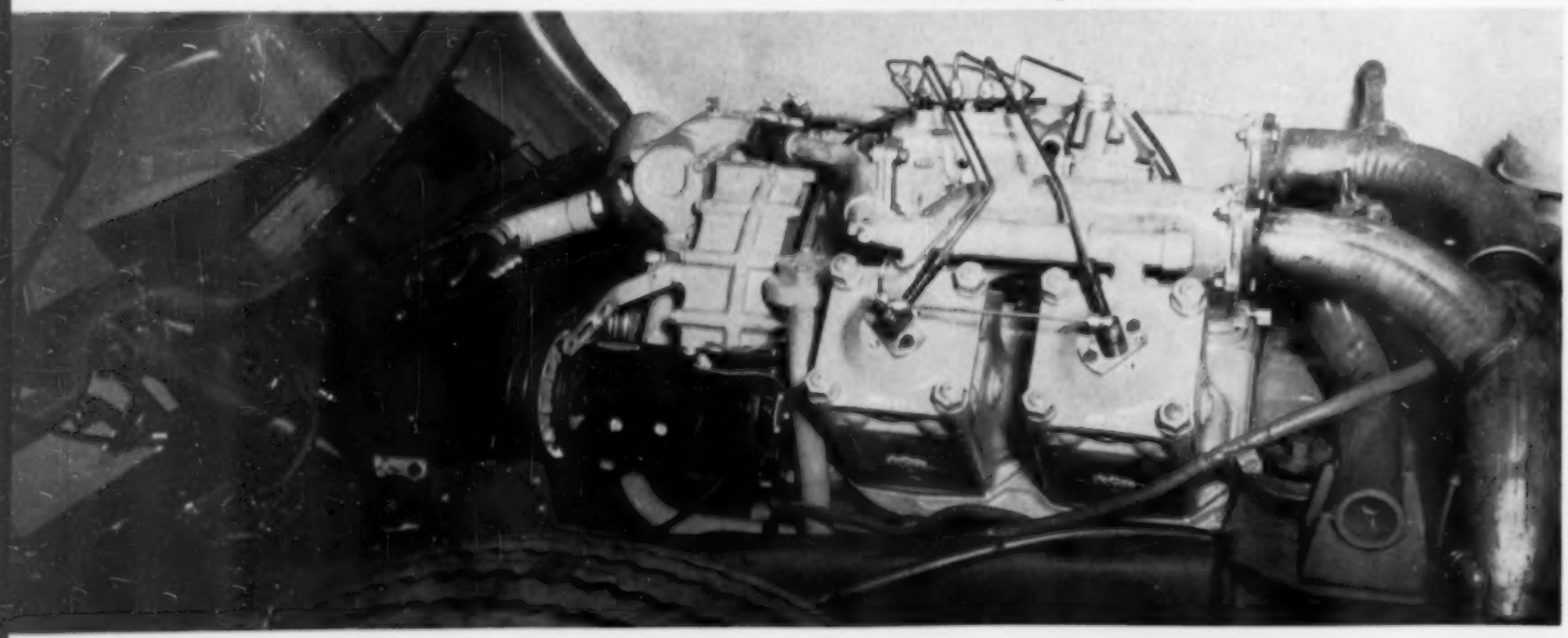
THE high-speed diesel user has economy in mind when he chooses a diesel over the carburetor engine. A casual survey of the high-speed diesel usage shows a definite advantage of fuel costs in competition with the gasoline engine. Meanwhile the small diesel engine has had handicaps in certain other respects, such as original cost, size, weight, serviceability, and maintenance or repair. One of the major trends in the diesel industry is the increase in power by increases in speed and torque. Higher output is attained by the use of more efficient blowers or supercharging means which, by increased air supply, raise both speed and torque, and by the two-cycle principle which doubles the number of working strokes.

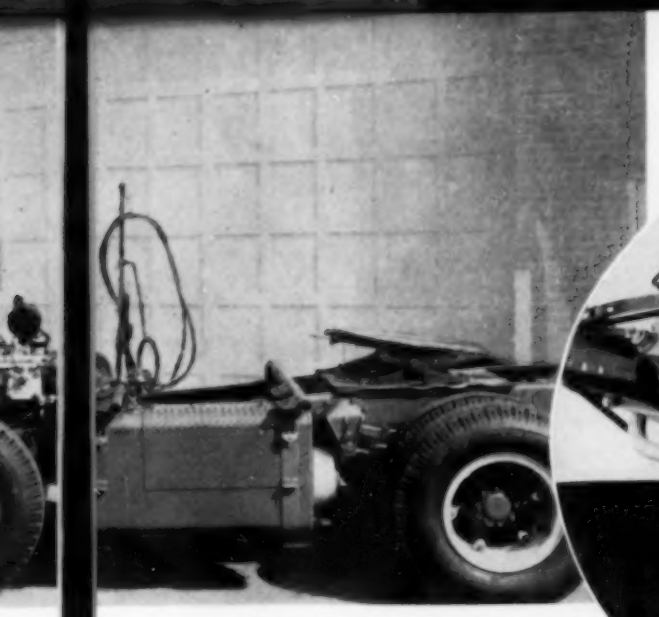
The problem of low production costs—also greater ease of maintenance and repair—can best be met by a more simple engine of smaller size and weight. An engine of these characteristics more nearly reaches the requirements for the small diesel engine in automotive equipment, marine propulsion, electric power generation, and miscellaneous other services. The tractor operator needs a lightweight, compact power unit with ease of maintenance. The marine service has long preferred the simple diesel engine for its low fuel cost and accessability. Low cost and lightweight are important in small generator sets. High engine performance without complicated mechanism is the desired feature by the small engine user.

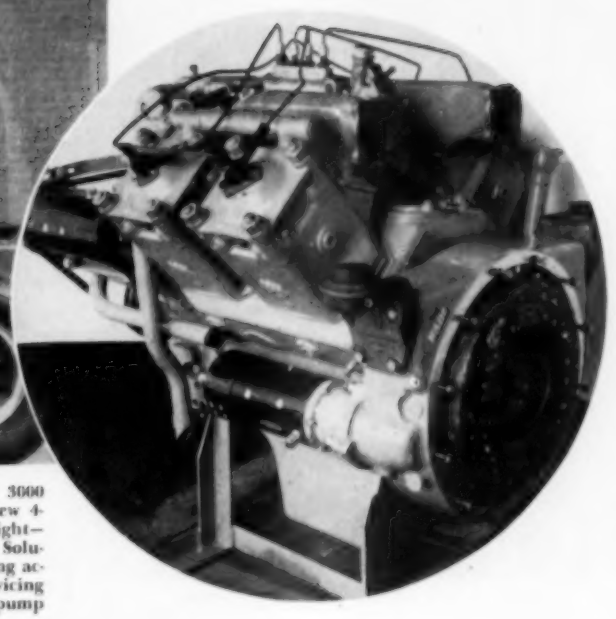
One of the large users of the small high-speed diesel is the trucking industry. Here, too, the trend for power is upward with operators continually demanding more performance to keep in step with trends in traffic, road speed and delivery competition. Engine horsepower and gross vehicle weight have been gradually increasing through the years. The present rate of increase in gross vehicle weight has diminished, waiting further highway improvement. Nevertheless, improved performance can still be attained by increased horsepower, making it possible to maintain a higher average speed with due regard for the maximum legal limit. This in turn means more miles traveled or a higher return with respect to fixed charges such as labor and taxes of various kinds.

A considerable increase in the horsepower of the gasoline engine may not be economic because of the increased first cost of the engine and the inherently poorer fuel economy of a throttling type engine at fractional loads. A similar increase in the horsepower of a diesel engine does not result in a like penalty in fuel consumption. The more powerful engine will not result in increased fuel consumption in most cases since the familiar fish hook fuel consumption curve is much flatter for diesel engines than for gasoline engines. In many cases the fuel consumption may actually be improved due to the inherently good part-load fuel consumption of the diesel.

The American Bosch fuel pump can be seen within the V in this left-side view of the new White V-4-106 diesel engine, installed in a truck chassis.







Above—A tilt-cab White Series 3000 truck is shown, powered by the new 4-cylinder, 170-hp White diesel. Right—Simplicity of design is apparent. Solution to V-design problem of grouping accessories to provide access for servicing can be seen here. Note Bosch fuel pump location.

In 1951, White made a survey of truck engine designs of Great Britain and Europe, and selected the Krauss-Maffei design as the most promising for further development in performance and arrangement to meet American requirements. this resulted in the White Motor V-106 diesel design which is protected by our own patent activity as well as exclusive American licenses under the Krauss-Maffei and Schnuerle patents. It was found desirable to modify the original design to simplify the arrangement and position of several engine components and accessories. Changes were made to conform with American practice including an increase in engine displacement and corresponding horsepower rating. The length and the height of an engine are most likely to cause interference. Therefore, it is very desirable that these two dimensions be kept as small as possible and that the dimensions of the engine with accessories installed be the important consideration.

The one problem of the V design is that of grouping accessories so as to provide adequate serviceability within the space requirements for the engine. The arrangement and position of the accessories as shown in the accompanying illustrations indicates that this challenge has been successfully met. The crankcase fits down between the frame members and the V arrangement of the cylinders extends over the frame channels without cramping.

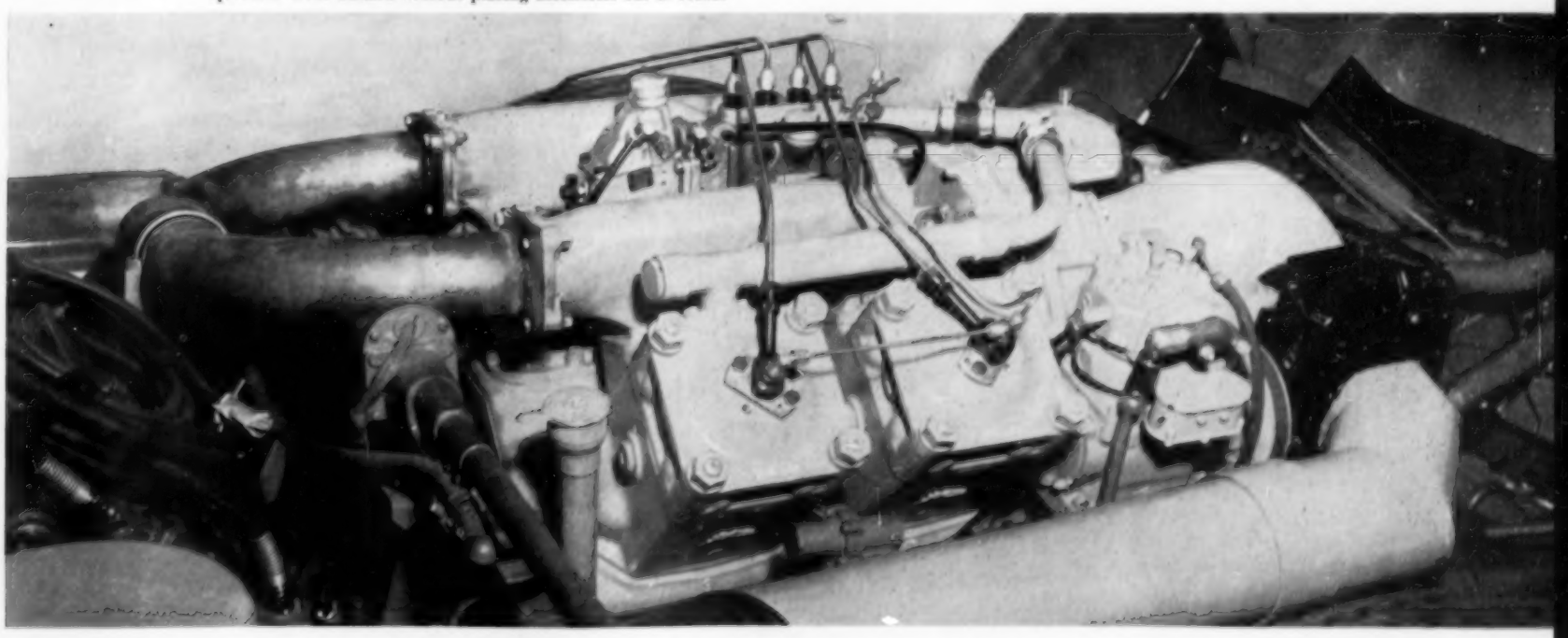
The length and height of the engine fit nicely while the somewhat increased width fills space which would otherwise be vacant. No modifications reducing the room in the cab are necessary. The position of the crankshaft and transmission with respect to the differential result in a normal and favorable angle of the drive shaft producing a minimum angularity in the universal joints.

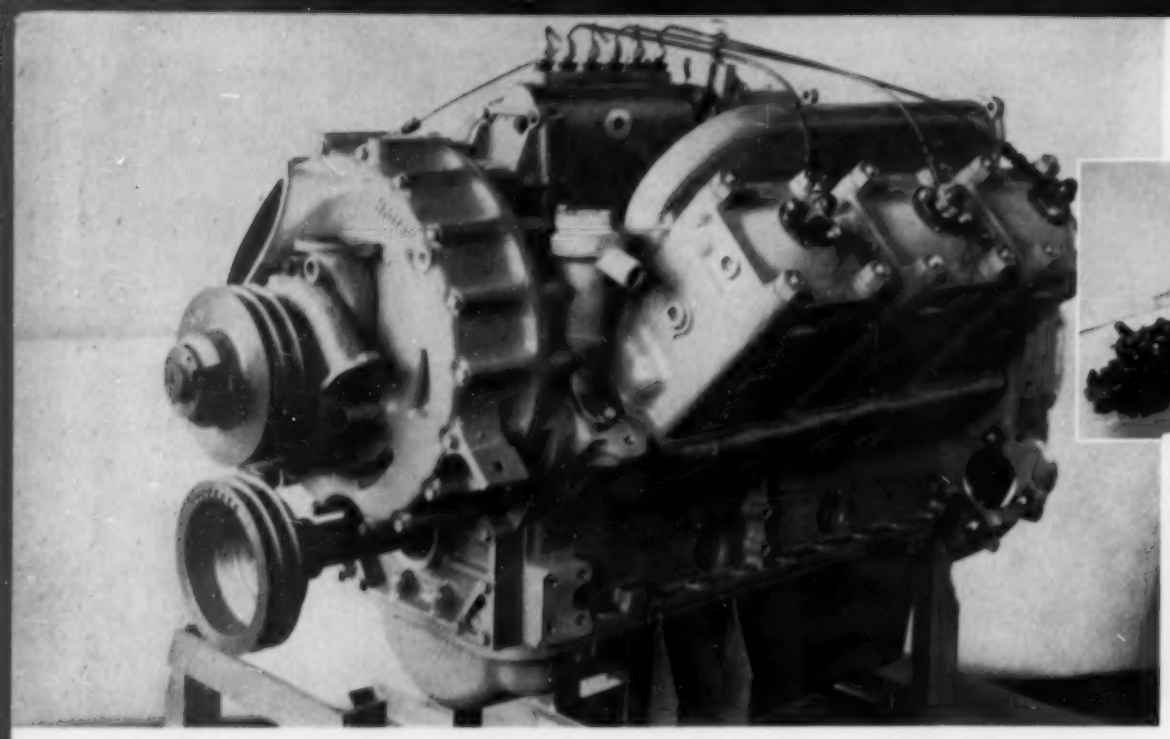
This engine is designed for the maximum flexibility and rotative speed and at the same time having a moderate piston speed. This resulted in a choice of the so-called square engine with 5-1/8 in. bore x 5-1/8 in. stroke, and a piston speed of 1879 feet per minute at 2200 rpm. The displacement per cylinder is 106 cu. in. At a rating of 170 bhp for the 4-cylinder engine at 220 rpm, the bmep is 72 psi.

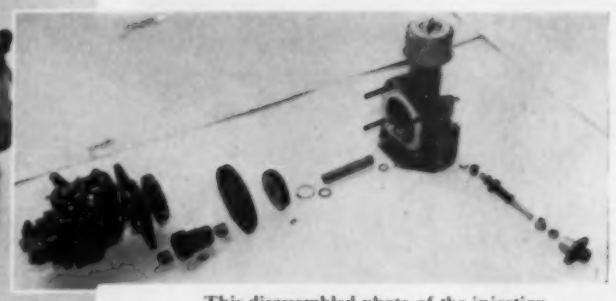
The three-main-bearing crankshaft weighs 155 lb. with 4 in. diameter main journals and 3 in. diameter crankpins. The overlap between the main journals and the crankpins is 15/16 in. This contributes greatly to the stiffness of the shaft. The two-cylinder 90° V cylinder arrangement produces an inherently well-balanced crankshaft, connecting rod and piston system. The crankshaft is counterbalanced for the rotating masses of the crankpin and the large end of the connecting rod and all vertical reciprocating forces. Only a very small horizontal component remains which is easily absorbed in the engine mounting. The crankshaft and connecting rod system is completely pressure fed with drilled holes in the crankshaft supplying oil to the crankpins which in turn feed oil through rifle drilled connecting rods to the piston pins and the spray jet for piston cooling. Precision bearing shells are used for both main bearing and crankpins with the thrust being taken by thrust washers at the center main bearing.

The crankcase is a single casting which carries the crankshaft and forms part of the air box on which the individual cylinders are mounted. The front end of the crankcase is machined for mounting of the gear train which drives the blower and injection pump. Various drilled holes serve as lubricating oil distribution passages. The water inlet manifolds are cast into the crankcase. The connecting rod is of the conventional H-beam section design for high strength, low weight and rifle drilled for lubrication of the piston pins with a spray jet at the upper end for piston cooling oil. The piston pin is mounted in spiral groove bushings both in the small end of the connecting rod and also the piston. It is full floating and retained by plugs mounted in the piston at the ends of the piston pin. The piston

This is a right-side view of the V-4-106 engine. It indicates how a minimum amount of space has been utilized without placing accessories out of reach.







This disassembled photo of the injection pump drive incorporates the Roosa Master fuel pump.

The White V-6 engine, showing from left to right the water pump, scavenging blower, and, in the V, the Bosch fuel pump. Note how the blower fits the engine contours and requires only a minimum of space.

is ductile iron having three compression rings of the Keystone type and carries two oil rings.

Each cylinder is an individual casting with an integral water jacket. Rubber "O" rings seal the water passage joints with the crankcase. The porting arrangement is that of the Schnuerle system having three exhaust ports flanked by three air inlet ports on each side. All the air inlet ports are directed away from the exhaust ports to more effectively displace the spent gases and minimize short circuiting of the fresh air to the exhaust ports. The exhaust passages from the ports are large, assuring free flow of the exhaust gases. The compact gear train with hardened teeth is designed and placed to keep the overall length of the engine at a desirable minimum.

The blower impeller is of the mixed flow type for best efficiency with a low noise level. The air enters the blower at the front of the engine and after passing through the impeller enters the spiral diffuser from which it flows through the transfer case into the air box in the V of the cylinder block. The oil pump is driven directly from the front end of the crankshaft by an involute spline. The oil pan with Floto oil screen carries 14 quarts of oil and is designed to best utilize the space available.

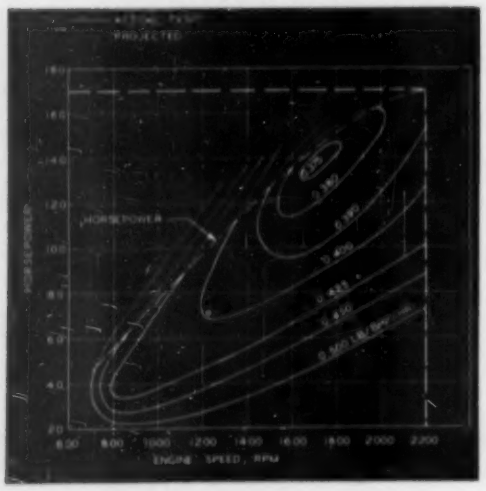
The injection nozzles are of the differential type and the injection pump is either Bosch, as was shown with the engine installed in the truck, or the Roosa-Master as shown in the exploded view, together with the various drive components.

The smaller number of parts of the V-106 engine obviously influences the cost of the labor and material in maintenance and adjustments. This principle is carried further in that this engine is being built in both four cylinder and six cylinder versions, and the eight cylinder engine will complete the family. All are 90° V angle engines in which nearly all of the chief wearing parts will be interchangeable among the three engine sizes. The present six cylinder engine extends the power range up to 255 horsepower.

The complete engine and its important components have been described, but we believe that it is equally significant that this engine does not have various working parts found in most other engines of similar size. The White V-106 engine being a two-cycle loop scavenged engine has no valves, valve gear or camshaft and, therefore, no assembly problems or adjustments and maintenance problems connected with such parts. In addition to this, the ability to replace individual cylinders without disassembling the connecting rods or removing the oil pan will appeal to diesel truck operators. Servicing of the engine in the truck with respect to minor repairs is practical and eliminates the need for interchanging engines except for major overhauls.

The four-cylinder engine weighs 1090 lb. for 170 hp when extensive aluminum construction is used, and 1355 lb. for the same horsepower when some of the major components are in cast iron. Corresponding weights for the six-cylinder, 255-hp engine are 1530 lb. for aluminum and 1900 lb. for the heavier construction. These weights include all regular installation accessories except the clutch.

Fuel consumption curves for the V-4 show characteristics with respect to speed and load. The diagonal broken line indicates the rated maximum load within engine's speed range. Optimum fuel consumption occurs in the most used speed range.



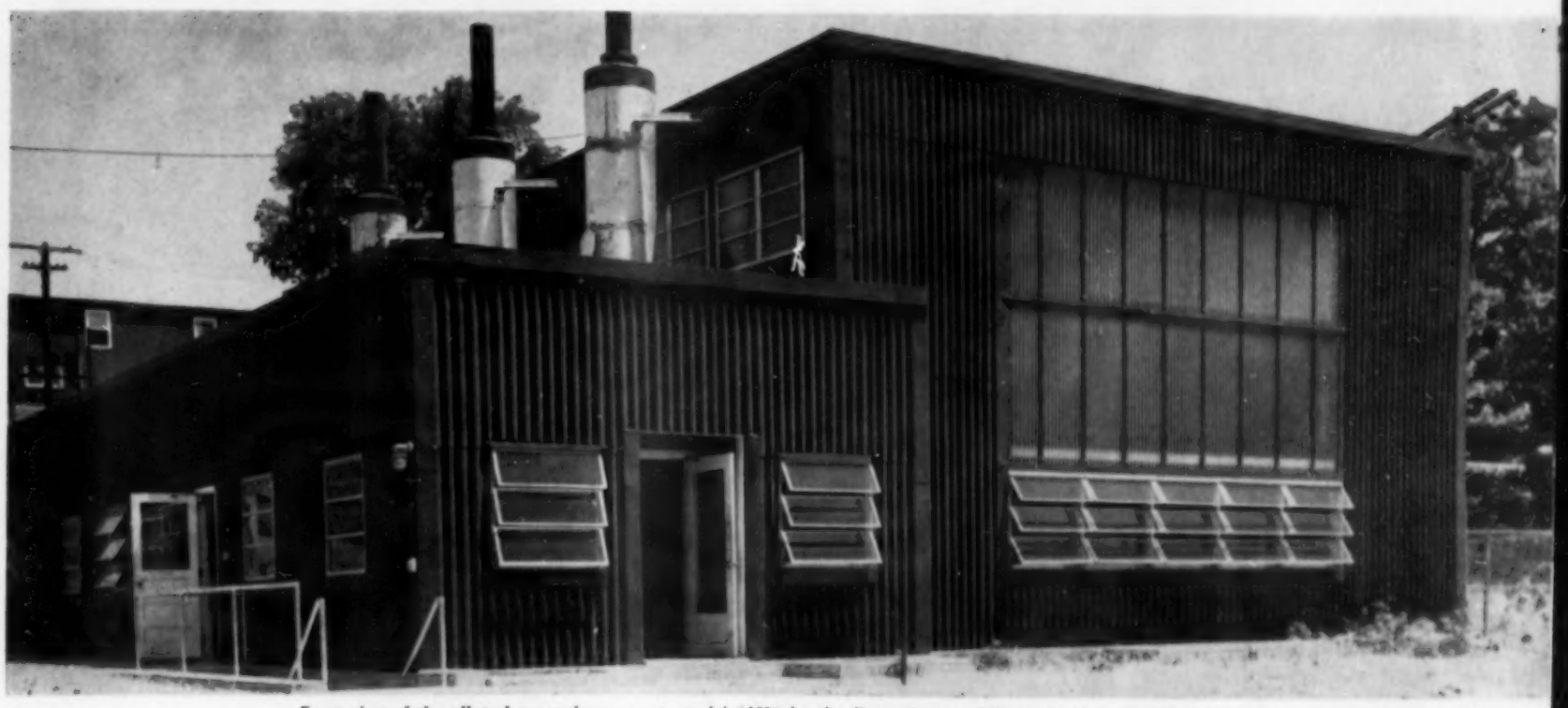
The overall dimensions of the V-106 are as follows:

	4-cyl.	6-cyl.
Length—rear of flywheel housing to front of fan	42-7/8 in.	52-1/2 in.
Width—edges of cylinder heads	36-1/2 in.	36-1/2 in.
Height—injection tubing Bosch pump to bottom of drain plug	39-13/16 in	39-13/16 in

To the engine operator, the performance characteristics are of importance at least equal to the design features, relative maintenance problems, and installation of the engine in the vehicle. Fuel consumption characteristics are shown in the accompanying chart. with respect to speed and load with the diagonal dashed line indicating the rated maximum load within the speed range of the engine. The optimum fuel consumption occurs in the most used speed range which inherently favors fuel economy on the job.

In competitive cold room starting tests of engines made by a major oil company, our prototype engine started without starting aids at temperatures down to 0°F. The favorable result of these tests indicates the attention given to this important characteristic. Similarly, recent comparative road tests in this country gave us considerable encouragement. Our present road test program is progressing nicely and indicates from fuel economy data that we have a highly competitive engine.

In the marine field, the simpler engines have been both large and heavy with respect to their horsepower. There is a real need for an equally simple engine which combines high output with light weight, thereby allowing a corresponding increase in the cargo. When these advantages are combined with lower fuel consumption and smaller fuel bunkers, considerable advantages result. The labor costs in maintenance and service of small electric generator sets gives the simple light weight engine a definite appeal. This engine is short enough to fit in the available space of the newer designs and is of such shape as to best use the available mounting space. The simplicity of the two-cycle, loop scavenged engine both for maintenance and repair is evident. These characteristics together with outstanding performance, we believe, insures that its presence will soon be felt in the trucking field and other applications where overall economy is becoming of increasing importance.



Front view of the all-steel power house constructed in 1954 by the Borough on a hill overlooking the Allegheny River. It houses three 960-hp Fairbanks-Morse dual-fuel engines.

BRACKENRIDGE, PENNSYLVANIA

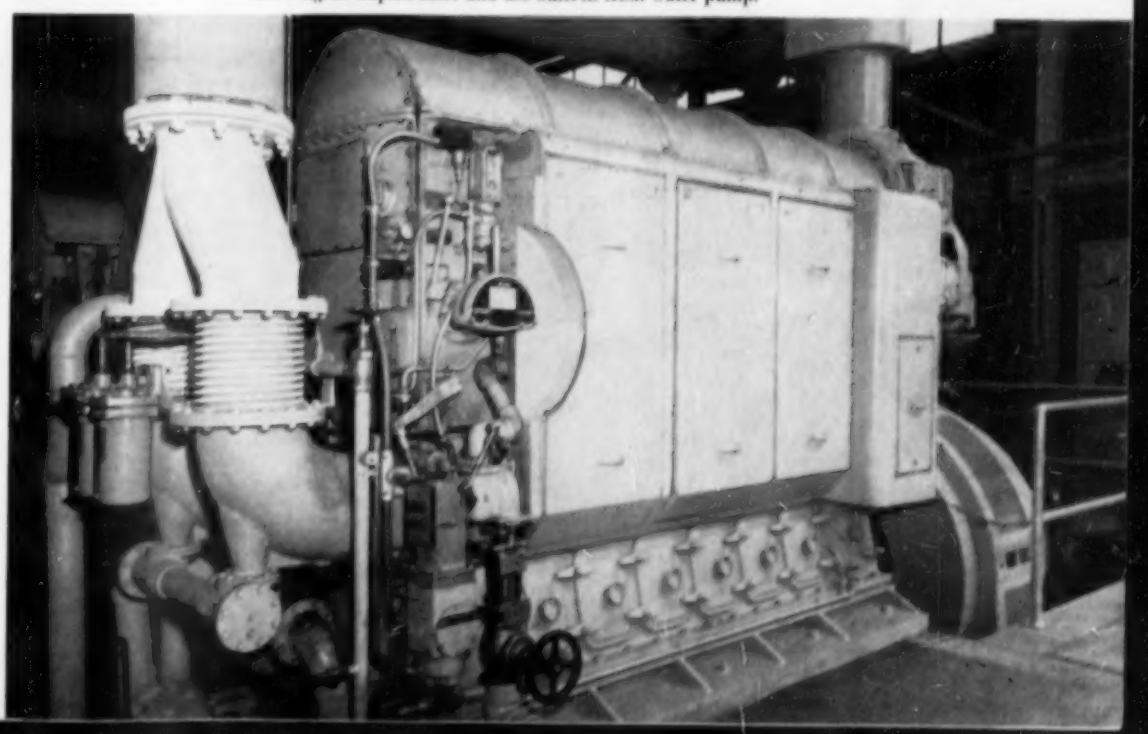
By W. H. BODE

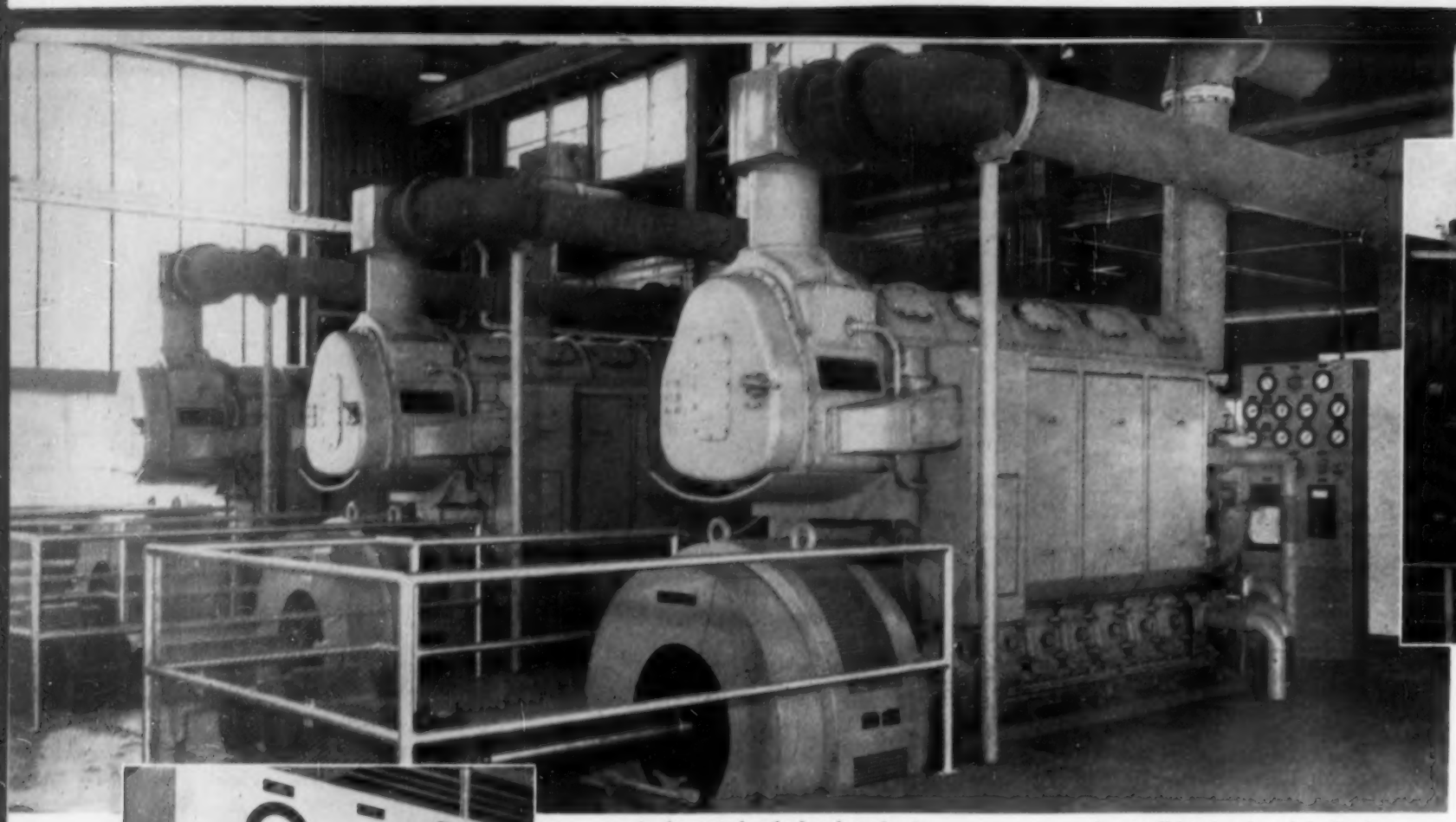
SINCE 1916, the Borough of Brackenridge, Pa., occupying only one square mile of territory 22 miles north of Pittsburgh, had been purchasing power from various sources and the question before the voters in 1952 was whether or not to continue this practice. The local Natrona Light and Power Co., a privately owned utility, had served notice that it could no longer continue operation and that its consumers would have to look elsewhere for service.

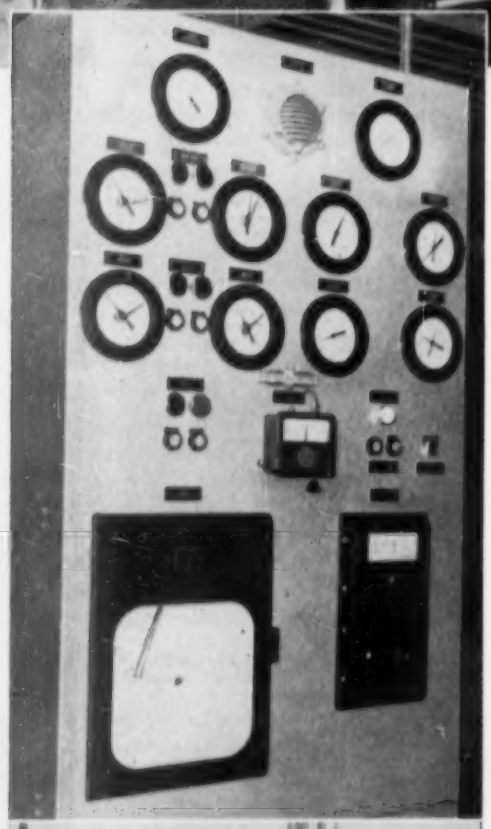
Rather than seek another source of purchased power, the citizens of Brackenridge decided to build their own power plant and in mid-1952 voted a 20-year bond issue for that purpose. Three 960-hp Fairbanks-Morse opposed-piston dual-fuel engines were ordered and a new all-steel power house was constructed on a hill overlooking the Allegheny River. In March, 1954, the plant was completed and the three O-Ps placed on the line. A month later dual-fuel operation was begun. March 31, 1955, marked completion of the first year of dual-fuel operation at the Brackenridge plant. Statistics released confirmed the soundness of the community's judgment. In the 12-month period, the three Fairbanks-Morse O-Ps had generated a total of 5,656,800 kw/hrs at a total production cost, including fuel oil, natural gas, lube oil and station labor, of $48,407.74. This represents an average of 8.55 mills per kw/hr. Actually, these figures included 21 days of oil operation in April, 1954, and the municipal power and light company also released totals for the 11 months between May, 1954, and March 31, 1955, during which all production at the plant was by dual-fuel. These totals were 5,241,600 kw/hrs at a cost of $43,851.86, or an average of 8.36 mills per kw/hr. (See Table I.)

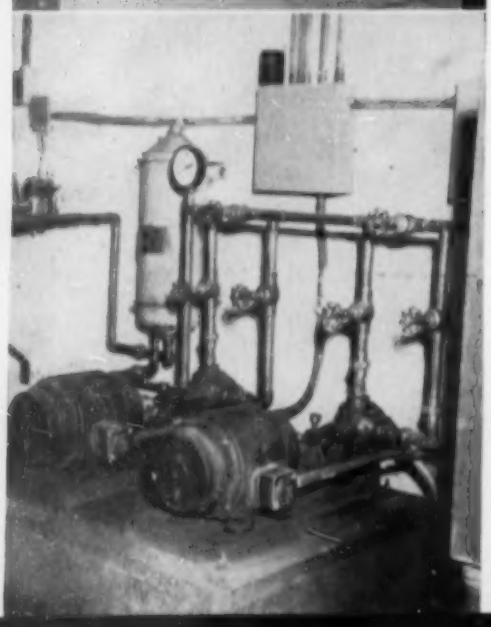
The first year's record of achievement satisfied everyone, including the skeptics, and did much to swell community pride in the new plant which had already become a showplace. The production-cost averages cited compared to an average price of 12 mills per kw/hr paid to the Natrona Light and Power Co. for 5,196,000 kw/hrs purchased in 1953. The Borough always has maintained its own distribution system so that in comparing present and

A closeup photograph of one of the F-M opposed-piston engines, showing the simplified control system. Also shown is the Chicago flexible hose fitting, the Woodward governor, the Nugent duplex filter and the built-in fresh water pump.









At the control end of each engine is an efficiently arranged gauge board, supplied by Lake Shore Electric Co. It contains an Alnor exhaust pyrometer, Marshalltown gauges, alarms, Bristol recording thermometer and a Midget levelometer.

An overall interior view of the Brackenridge plant, showing the arrangement of the three Fairbanks-Morse dual-fuel engines, their alternators, guage panels, and exhausting system.

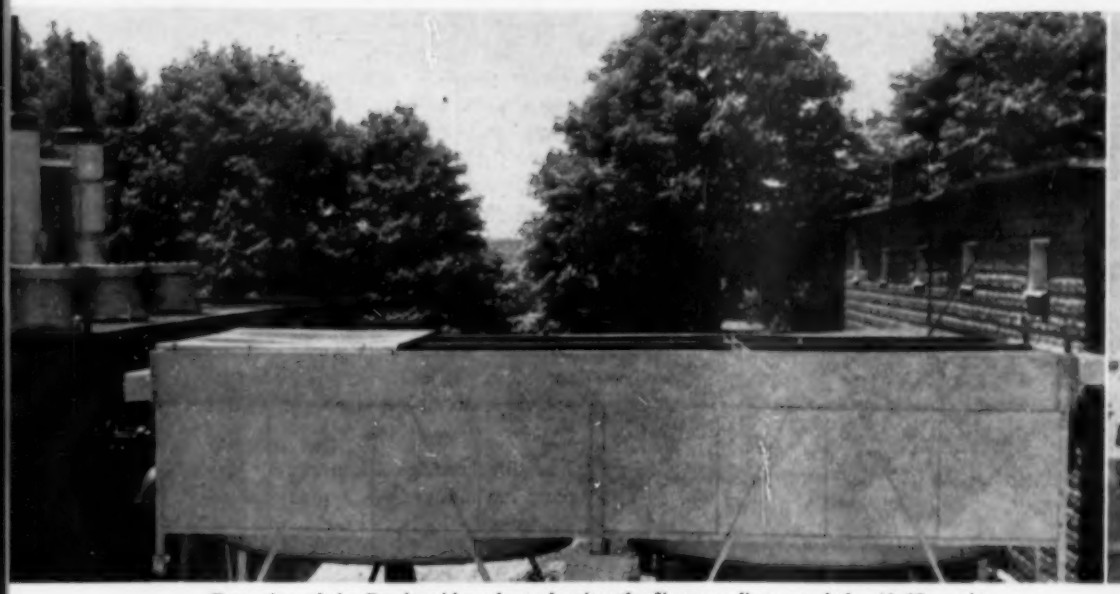
past costs, distribution expenses may be taken as constant. Though the Borough is hemmed in on all sides by neighboring communities, precluding the possibility of territorial expansion, it is felt that a normal increase in business activity and in the use of modern electrical appliances will steadily increase annual production from year to year, reduce unit cost of overhead and result in even greater profit to the community in the future.

Among the obstacles that had to be hurdled before the plant's success could be achieved were the problems of fuel cost and the unavailability of experienced personnel in the community. Natural gas is delivered at Brackenridge at the high price of 42 cents per 1000 cu. ft., including discount, which led some to fear that an investment in dual-fuel equipment might not be justified. At the same time there was local resistance to the idea of bringing experienced diesel operators in from the outside, a solution which seemed necessary since no one could be found in Brackenridge who had such experience. Both problems were solved effectively without the need of compromise.

The plant's operating records for the 11-month period from May, 1954, through March, 1955, reveal how effectively the efficiency of the O-P engines compensated for the high fuel prices. In producing 5,241,600 kw/hrs they consumed a total of 53,006.1 mcf of gas at a cost of $22,262.53. At the same time they consumed 53,052 gals of pilot oil at a cost of $5,927.08. This represents a total fuel cost for the plant of $28,189.61, or an average of 5.37 mills per kw/hr. (See Table I.) In terms of thermal efficiency, the performance of the three Fairbanks-Morse engines is even more revealing. The pilot oil used at Brackenridge is 39.7 grav., A.P.I., and has a higher heat value than 135,924 Btu per gal. The natural gas used has a guaranteed higher heat value of 1000 Btu per cu. ft. By averaging 10.11 cu. ft. of gas per kw/hr and .0101 gal. of oil per kw/hr throughout the period, the three O-Ps achieved an average of 11,482 Btu per kw/hr. Since each unit operates often at a load factor of 60% or lower, it is expected that this average will improve considerably as the demand increases. At the present time the load placed on the plant frequently reaches 800 kw, which means that two 675-kw units have to be placed on the line. Lube consumption during this period totaled 2915 gals., for an average of 4067 hp/hrs per gallon.

The problem of providing qualified operators was solved with the help of the engine manufacturer. While construction was still going on, a Fairbanks-Morse engineer held "school" for five prospective operators, including a plumber's helper, a truck driver, a street department laborer, and two former linemen for the Borough's water and light department. These men were instructed in the basic design of the opposed-piston engine. They were taught how to assemble and disassemble the various engine components, how to read temperatures and pressures and how to operate and maintain the auxiliaries. The engineer even went so far as to tag every piece of equipment in the plant in order to minimize the possibility of a mistake during these first days. When this initial period of instruc-

Diesel oil from the storage tanks is sent to the individual day tanks by two 10-gpm F-M transfer pumps. It passes through Niagara meters and a Briggs full-flow strainer enroute.



Rear view of the Brackenridge plant, showing the Young radiators and the Air-Maze air intake filters which serve the Fairbanks-Morse opposed-piston diesels.

Beneath each engine, in the plant's basement, are a Ross lube oil cooler, Air-Maze lube strainers, and an F-M cartridge-type lube oil filter. An Amot automatic control valve by-passes lube around each cooler.

tion was completed, the operators were confident of their ability to run the plant. They had learned how to interpret switchboard readings and how to synchronize the alternators. They knew when to put an engine on the line and when to take one off. They knew when to switch from gas to diesel and from diesel to gas. Even the department's two linemen joined the instruction group, ready to step in as standbys in the event of emergency.

After the first engine went on the line, the factory engineer remained at the plant for several weeks, permitting the men to operate the equipment under his supervision. Then he left, confident that the Brackenridge plant was in good hands. Under Louis Affrica, Superintendent of Electric and Water, it has been doing handsomely ever since, as reflected in the operating records. The success of the training program at the Brackenridge plant indicates that it is possible in a short period of instruction to teach men without previous experience to operate a modern diesel power plant safely and efficiently. The three Fairbanks-Morse O-P engines at this plant, for example, have been so simplified in design that they are easy to operate and maintain. Also, there are many automatic safeguards. If the gas supply should fail, the engines immediately and automatically switch over to oil.

If the pilot oil pressure should fail on the other hand, the affected unit automatically shuts down, thus preventing gas from collecting in the system. The engines regularly carry a full load of gas. They can be switched back and forth between gas and diesel smoothly and without any sign of trouble. Although it is customary to cut the load on each engine when switching from gas to diesel, the crew often does not—again without trouble.

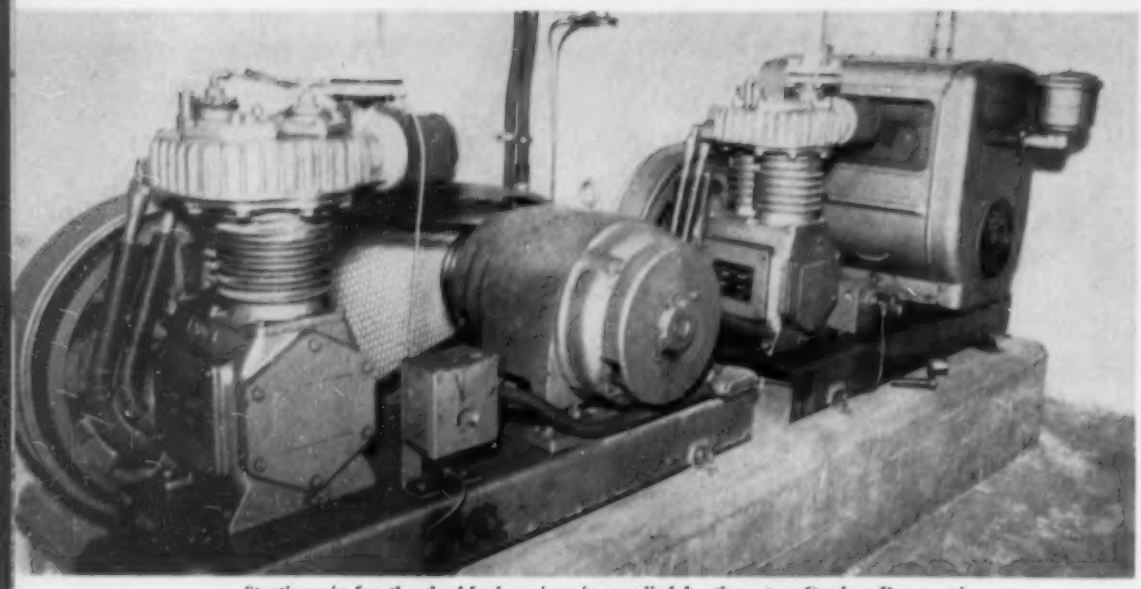
No. 2 diesel oil is delivered by truck and is unloaded into two 10,000-gal. underground storage tanks. It flows by gravity through full-flow strainers to two 10-gpm. motor-driven transfer pumps and is sent through individual meters to three 150-gal. overhead day tanks. These day tanks, located above each engine, are equipped with high and low level float controls. From the day tanks, the fuel flows by gravity to each engine, being picked up by the engine-driven supply pumps and sent under pressure through duplex filters to the two injection pumps and nozzles at each cylinder. Drainage from the engines is collected in a standby sump and is returned to the storage tanks.

Natural gas arrives at the plant at a pressure of 6 lbs. and is boosted to 36 lbs. before reaching the engines. It passes first through two regulators and three meters, which are arranged in parallel. From the meters, the gas flows through a header to three motor-driven compressors, rated at 134 cu. fpm at 36 lbs. and driven by 25-hp. explosion-proof motors. These compressors are cross-connected so that any engine can be served by any compressor or combination of compressors. In this way a single compressor can be used to serve two engines up to 1000 kw. thus saving the power costs of a 25-hp motor. To keep the gas at a constant temperature, each unit is equipped with a radiator and an air-to-gas heat exchanger.

A high-detergent type lube oil is stored in two 350-gal. storage tanks located in the plant's basement. A 10-gpm. motor-driven transfer pump sends it through a common header to all engines, where it is picked up by a built-in, engine-driven pump and distributed to all working surfaces and to the pistons for cooling. Still under pressure from this pump, the oil passes through a shell-and-tube type cooler, through a duplex strainer and finally returns to the engine. A continuous by-pass from the lube oil system on each engine is circulated through a cellulose-cartridge-type filter for added protection. Each oil cooler is equipped with an automatic control valve, by-passing lube around the cooler as needed in order to keep it at the most efficient operating temperature. For

TABLE I

Month	Kw. Hrs. Generated	Fuel Oil Consumed (Gals.)	Gas Consumed (MCF)	Total Fuel Cost (Gas & Oil)	Total Production Cost	Fuel Cost Per Kw. Hr. (Mills)	Production Cost Per Kw. Hr. (Mills)
1954							
March	172,800	15,069	.....	$ 1,702.79	$ 1,756.08	9.85	10.16
April	415,200	19,259	2,332	3,155.65	4,555.88	7.60	10.97
May	412,800	4,563	4,133	2,251.70	3,693.95	5.45	8.95
June	420,000	4,461	4,305	2,312.41	3,663.16	5.50	8.72
July	420,000	4,427	4,346.3	2,325.70	3,748.70	5.53	8.92
August	420,000	4,573	4,385.1	2,358.50	3,811.75	5.61	9.07
September	422,400	4,615	4,414.9	2,307.96	3,719.21	5.46	8.80
October	484,800	4,993	4,964.9	2,649.51	4,072.51	5.46	8.39
November	504,000	4,738	5,119.4	2,685.37	4,066.37	5.32	8.06
December	576,000	5,448	5,716.8	3,016.32	4,560.32	5.23	7.91
1955							
January	559,200	5,208	5,481.0	2,890.52	4,343.77	5.17	7.76
February	499,200	4,777	4,898.9	2,597.34	3,894.34	5.20	7.80
March	523,200	5,249	5,240.8	2,794.28	4,277.78	5.34	8.17
Total 1st 13 Months	5,829,600	87,379	55,338.1	33,048.03	50,163.82	5.66	8.60
Total 1st Year	5,656,800	72,310	55,338.1	31,345.24	48,407.74	5.54	8.55
Total Dual-Fuel (11 Mos.)	5,241,600	53,052	53,006.1	28,189.61	43,851.86	5.37	8.36



Starting air for the dual-fuel engines is supplied by these two Gardner-Denver air compressors, one driven by a motor and the other by a 4-cylinder gasoline engine.

starting operations, a 50-gpm pre-lubrication pump, driven by a 3-hp motor, is provided.

Makeup water for the jacket water system of each engine is drawn from the city mains and is softened and treated before use. It is circulated through each engine by a built-in, engine-driven pump, which sends it through one of two horizontal radiators, through the lube oil cooler, and then back to the engine. An automatic control valve by-passes about 2/3 of the jacket water around the radiators, the other ⅓ being cooled in the radiators from approximately 170°F. to 120°F. This cool water keeps the temperature of lube oil leaving the cooler at a constant 180°F. Each radiator is equipped with a 108 in. copper-blade fan, driven by a 15-hp two-speed motor.

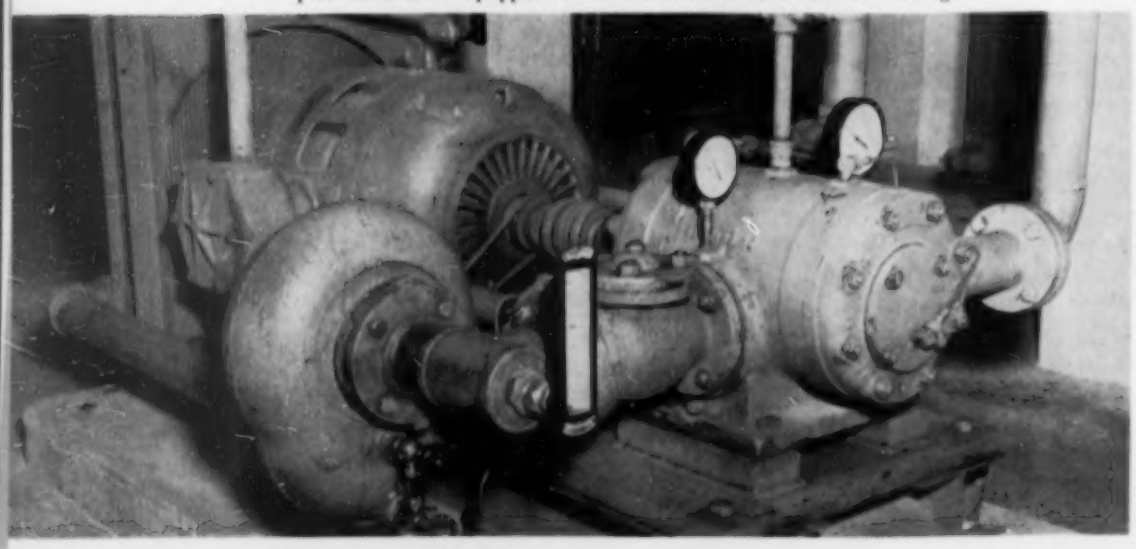
Scavenging air for each of the engines, drawn from the outside through an oil-bath type filter on the lower roof of the plant and through a silencing elbow, is supplied to the cylinders by a built-in, positive-displacement type blower, which is driven off the upper crankshaft. Starting air is supplied at a pressure of 250 lbs. by two reciprocating compressors, one driven by a 7½-hp motor and the other used in emergencies, by a 4-cylinder gasoline engine. It is stored in three 20-in. by 72-in. receivers. Also mounted on the lower roof of the plant are three side-inlet, vertical exhaust snubbers serving the three engines. All exhaust lines are fitted with flexible metal hose to reduce vibration, as are air, gas, lube, pilot oil, and water lines.

At the control end of each engine is a compactly arranged gauge board, containing pressure gauges on scavenging air, starting air, and duplex pressure gauges on gas, lube oil filter and lube oil strainer. There are both gauges and a 24-hour recording meter on lube and jacket water temperatures. Also installed on the board are an alarm panel, with visible and audible alarms on jacket water pressure and temperature and lube oil pressure and temperature; a multi-point exhaust pyrometer, and a control switch for the respective 50-gpm pre-lubrication pumps.

Power is distributed at an 11-panel switchboard, equipped with a swinging synchroscope and solenoid-operated circuit breakers. These circuit breakers operate on dc current and are of the drop-out type, for easy removal. There are three ac and three dc generating panels on the board, one metering panel and four distribution panels.

The ac panels are equipped with kw meters and acm meters, and the dc panels with meters on amperage, alternator temperatures and engine hours. On the swinging synchroscope are a line voltage meter and an incoming generator voltage meter. Other instruments on the board include regulators for the exciters, plus differential protection and overcurrent relays. The alternators are equipped with neutral reactors, in connection with the differential protection; with surge capacitators and lightning arresters; and with temperature detectors, which permit temperature readings at five points in the alternator windings.

One of the Ro-Flo Allis-Chalmers gas compressors which boost the pressure of gas to 36 lbs. before it reaches the dual-fuel engines. Each compressor is driven by a 25-hp explosion-proof motor and is equipped with Yates American radiator and heat exchanger.



The Brackenridge Electric and Water Department has always been a profit-making branch of the municipal government, helping to keep taxes down by returning sizable sums of money to the Borough at the end of each year. In the last five years, for example, when it was still purchasing power at the rate of 12 mills per kw/hr, it returned $177,000 to the general fund, in lieu of taxes; $23,000 to the water fund; and $25,000 to the power plant fund. In all, this makes a total of $225,000 returned to the borough since 1949, a significant sum in a community of this size. With its own municipal power plant, the department expects to pay off the bonds and still increase these annual dividends.

Guiding the new plant are Mr. Affrica, superintendent, and the Electric and Water Committee, consisting of Charles Murdock, chairman, Louis Chifulni and Andrew Glath. Ultimate responsibility for its success rests with William A. Fischer, Burgess of the Borough, and with the following members of the Borough Council: Joseph S. Cusman; Rudolph Svitek; Leo A. Monti, plus Messrs. Murdock, Chifulni and Glath.

List of Equipment

Main engines—Fairbanks-Morse Model 38D8⅛, 6-cylinder, 8⅛x10-in., two-cycle, opposed-piston, dual-fuel engines, rated 960 hp at 720 rpm.
Alternators—Fairbanks-Morse 675-kw, 3-phase, 60-cycle, 8-pf., 4160-v, shunt-wound.
Full-flow diesel oil strainers—Briggs.
Diesel oil meters—Buffalo.
Diesel oil duplex filters—Nugent.
Diesel oil—Gulf Dieselect.
Lube oil—United.
Lube oil strainers—Air-Maze.
Lube oil coolers—Kewanee-Ross.
Automatic control valves—Amot.
Jacket water radiators—Young.
Air intake filter and silencer—Air-Maze.
Air compressors—Gardner-Denver.
Air compressor engine—Waukesha.
Flexible hose fittings—Chicago Metal Hose.
Gauges—Marshalltown.
Temperature recording meters—Bristol.
Exhaust pyrometer—Alnor.
Switchboard, gauge panel, and motor control panel—Lake Shore Electric.
Gas meters—Rockwell.

A. D. Haynes II on a test run from the Dravo Shipyard, Neville Island, Pittsburgh.

DIESEL SHIP "A. D. HAYNES II"

By REX W. WADMAN

PITTSBURGH, Nov. 9—A new chapter in inland waterways transportation history was written here today as two ultramodern river towboats were christened during impressive ceremonies at the Neville Island shipyard of Dravo Corporation. Built for one of the nation's leading common carrier barge lines, the Mississippi Valley Barge Line Company, St. Louis, the new 200-foot vessels are the most powerful twin-screw diesel towboats ever to enter river service. Each is powered by two engines operating at 4200 horsepower.

One of the sister ships, the *Valley Transporter*, was christened here this morning in traditional ceremonies at 11:30 a.m. Mrs. G. C. Taylor, Kirkwood, Mo., wife of the barge line company's president, broke a bottle of champagne on the vessel's hull as it started down the launching ways. Her aide was Mrs. A. M. Thompson, Chicago, wife of the board chairman of the barge line. Half an hour later, the second ship, *A. D. Haynes II*, was christened. It had been launched September 1. Sponsor of this vessel was Miss Phyllis Haynes, Vicksburg, Miss., sister of the late A. D. Haynes II. Capt. Haynes, a veteran river pilot was marine superintendent for the barge line from 1940 until his death, August 16, 1955. Mrs. William Forester, Covington, Ky., niece of Capt. Haynes, served as sponsor's aide. More than 125 guests, including a large delegation from St. Louis, attended the ceremonies and were served luncheon aboard a special barge towed on the river by the new towboat, *A. D. Haynes II*.

Mississippi Valley Barge Line will use the powerful twin-screw towboats mainly in the lower Mississippi River trade, between Cairo, Ill. and New Orleans. Officials of the company explained the new vessels play a major part in modernizing the line's fleet to meet increasing demands for common carrier shipping service on the inland waterways. With the new towboats, Mississippi Valley's fleet now totals 22 motor vessels and over 500 barges. In selecting the name, *A. D. Haynes II*, for one of the new towboats, the Company paid tribute to one of its veteran employees, a widely known riverman. Capt. Haynes made many contributions to the construction of the vessels. He long believed in bigger horsepower for towboats, in better hull design and other innovations. Capt. Haynes worked closely with Dravo officials during planning and construction, and many of his ideas were incorporated in the towboats. The name of the other boat is taken from that of a famous old steam sternwheeler, the 500-horsepower, *Transporter*, which was built in 1921 and operated along the Ohio, Mississippi and Illinois Rivers.

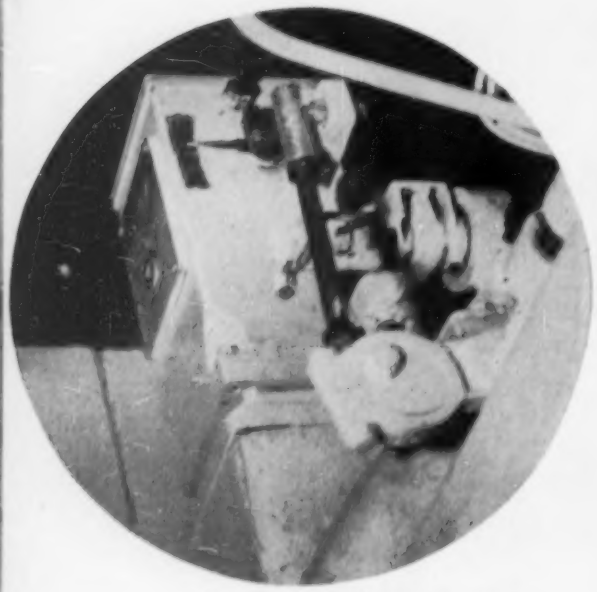
Extensive research and tests at the Netherlands Ship Model Basin in Holland provided the basis for the underwater design of the vessels, which have many innovations for this type towboat. The hull, of welded steel construction throughout, is 45 feet wide and 12 feet deep. Fitted into the bow are four heavy towing knees. The hull aft is shaped to house the twin propellers in specially designed cast steel Kort Nozzles that weigh 16 tons apiece. Objective of the stern design is to provide an efficient propulsion system without exceeding minimum draft requirements. Unique design of the two steering and four flanking rudders provides exceptional maneuverability. The 10-foot diameter propellers also are unique. Cast of stainless steel, each has five blades to minimize vibration. Propeller shafts are 11½ inches in diameter.

The two main engines, located amidships in the two-story engine compartment, are 12-cylinder Nordberg diesels connected to oil-operated, reverse-reduction gears. Electrical power is generated aboard the vessel by two diesel engine generator sets. The generator room is separated from the engine room and quarters by steel bulkheads with sound and thermal insulation. Fuel oil bunkers for the main engines and other oil-burning equipment carry enough fuel for approximately 43 days of nonstop operation. All tanks are cross-connected and can be filled from either side of the boat. This also permits transferring fuel between tanks for maintaining trim.

A control room, with indicator and control panels for operation of electrical and mechanical propulsion equipment has been provided for the engineer. The vessel literally is designed for fingertip operation and employs two separate systems of control. Underway steering is handled by an electrical system working through an automatic pilot actuated by a small finger length lever. The other is pneumatic control for close maneuvering or locking which is actuated by two small knobs no larger than those found on ordinary doors. One knob takes care of all four flanking rudders and the other handles both steering rudders. Similar knobs are installed in a control stand on each wing of the bridge. This enables the pilot to maneuver the boat while outside the pilothouse.

Among the pilothouse accessories that aid navigation of the vessel are improved radar equipment to provide better definition of objects; a gyro-compass; depth-finding instruments to indicate water

Spacious pilothouse contains all of the latest navigational aids, including depth finders, improved radar, fingertip steering knobs, gyro-compass and automatic pilot.



Close-up of the Massey governor on one of the 12-cylinder Nordberg 4-cycle Elliott turbocharged diesels driving the *A. D. Haynes II.*

depth at the head and on each side of the leading barges in a tow; and a radio-telephone. All windows in the pilothouse have aluminum sash and are fitted with tinted, heat-resistant glass. An eight-station Teletalk system connects important locations aboard. An all-in-one kitchen unit, with refrigerator, coffeemaker and sink is provided in the pilothouse.

Comfort of the crew was an important consideration in designing the vessel. All quarters are air conditioned. There are five staterooms aft of the galley on the main deck and six other staterooms, including a guest room, on the second or upper deck. The officers' lounge on the second deck and the crew's lounge on the main deck are equipped with television sets. The crew's lounge is also equipped with a kitchenette. The quarters have been attractively decorated. Teakwood flex-board paneling is used in the lounge, hallways and the pilothouse.

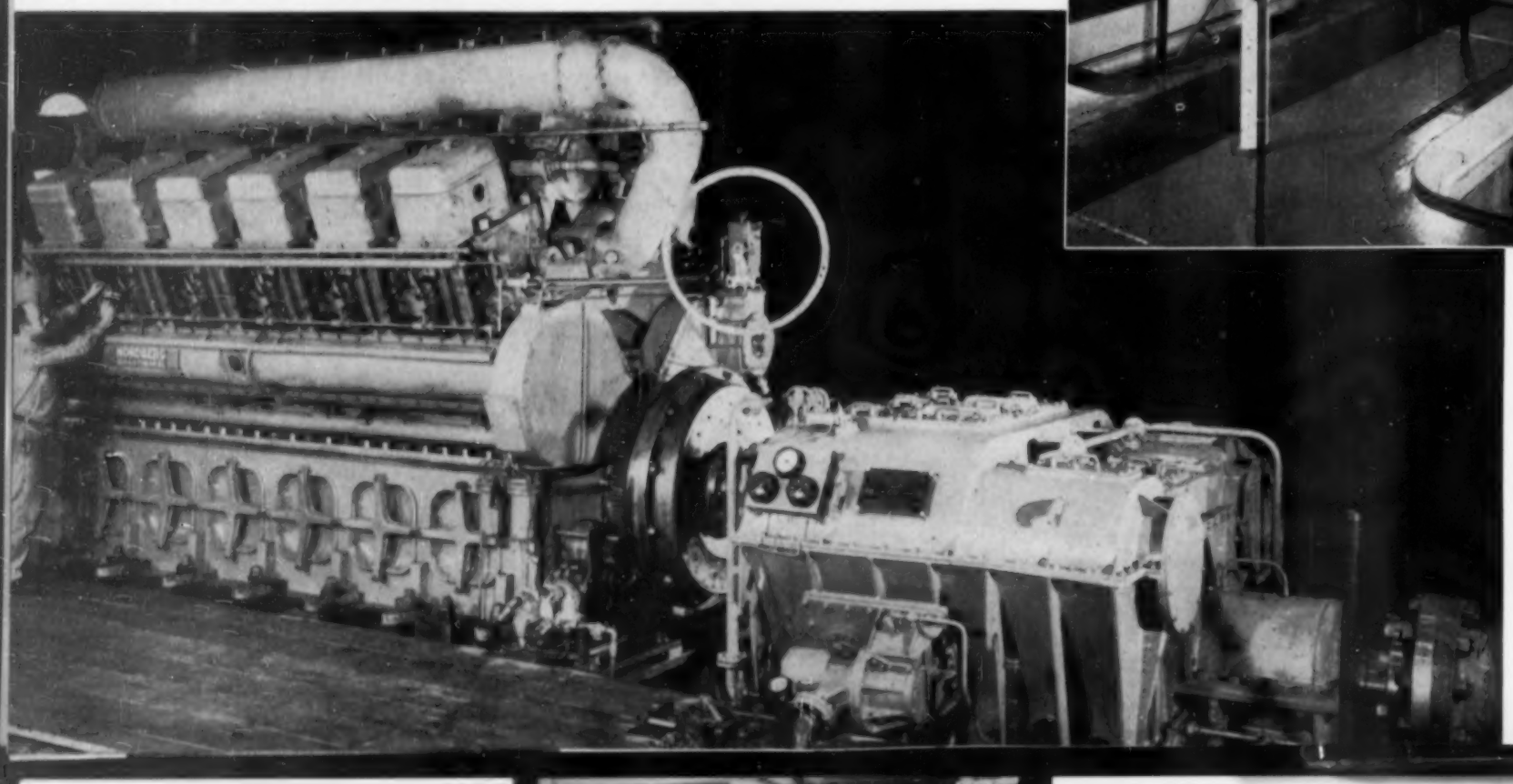
The galley, separated from the mess room by an aluminum and plastic panel partition, features two electric ranges, automatic dishwasher, waste food disposer and other modern appliances. A separate room is devoted to refrigerated food storage facilities, including about 70 cubic feet of deep freezer space and 218 cubic feet of refrigerator space. The mess room service is arranged for 12 persons at a time around an 18-foot long table.

Getting back to some of the engineering details of the ship, the molded length is 200 feet, the molded beam is 45 feet, and draft with normal fuel aboard is 8 ft. 9 in. with a level keel. The propulsion power is supplied by Nordberg Supairthermal V-type diesel engines totalling 4200 bhp per vessel. These engines were built in Nordberg's Milwaukee plant and were furnished in matched pairs with opposite rotation for twin-screw installation. These propulsion engines are four-cycle, non-reversing marine type, each with 12 cylinders of 13-inch bore and 16½ inch stroke. Each Supairthermal engine drives a Hindmarch-DeLaval reverse-reduction gear through a tangential spring coupling—built both in England and Trenton, N. J., and because these reverse-reduction gears are quite a new development in marine application in this country, we will describe them for you in quite some detail.

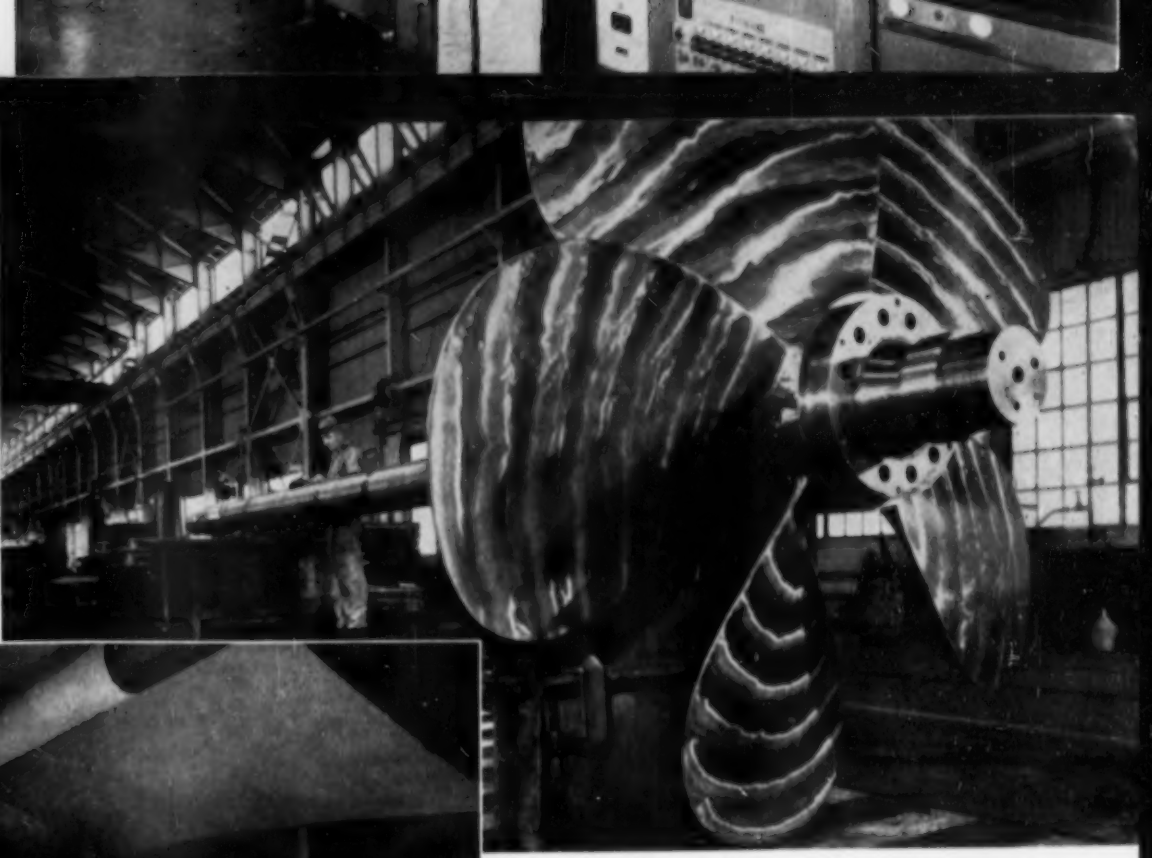
The Hindmarch-DeLaval reverse-reduction gear was developed in England by the Modern Wheel Drive Ltd. The DeLaval Steam Turbine Company of Trenton, N. J., took a license to manufacture these units in this country and the four gears in these two towboats are the result of active cooperation between Modern Wheel Drive in England and DeLaval in Trenton. Designs are available to accommodate any number of engines from one to four and the gear reduction can be arranged to suit any individual requirements.

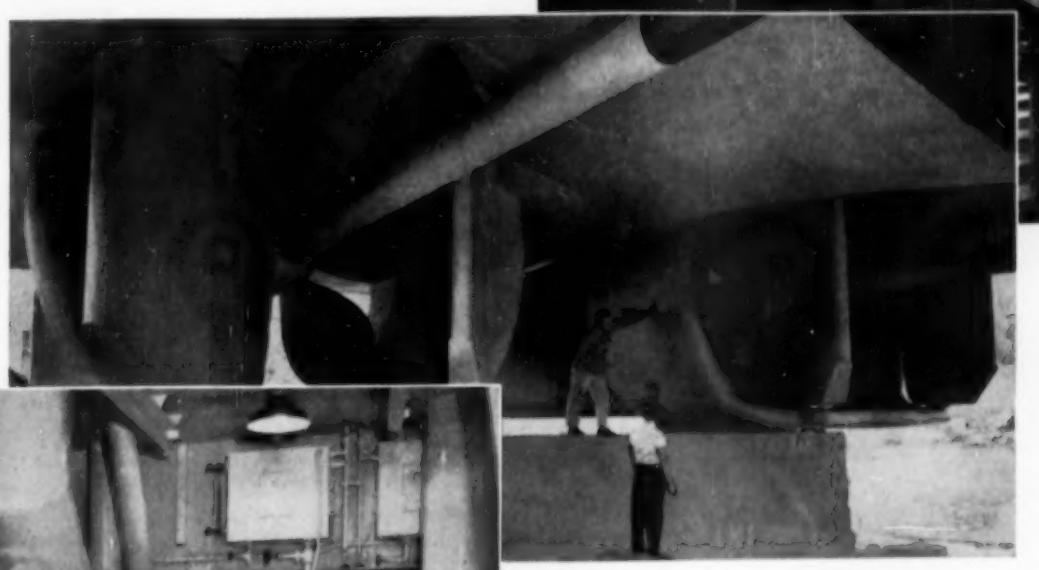
The modern tendency in marine practice has been towards multiple-engine drives for main propulsion. One of the most outstanding problems has been the method of transmitting the power from two or more medium or high-speed engines to the propeller shaft through a mechanism incorporating the following: (1) A reduction ratio so that the most efficient propeller speed can always be maintained. (2) Ahead and astern running while all the engines continue to run in the same direction of rotation. (3) The necessity of being able to isolate quickly any engine from the power transmission at will while the remaining engines continue to drive the propeller. (4) Quick, simple, smooth and reliable maneuvering. Multiple-propulsion has the following advantages: (a) When only reduced power is needed, complete units may be shut off, thus ensuring considerable economy in fuel, lubricating oil and wear and tear when a vessel is operating on light duties. (b) In the event of trouble with one engine, it can be shut down and the vessel be enabled to carry on without substantial loss of speed. (c) Spare engine parts can be carried aboard enabling routine overhauls to be carried out while the vessel is in commission. (d) The engines are not required to be reversible units.

In the case of all Hindmarch-DeLaval oil operated transmissions, the ahead and astern wheels each incorporate an oil-operated coupling which consists of two inner and two outer members. The two outer members are carried and are free to rotate on the sleeve or hub of the two inner mem-



bers, which in turn are carried on longitudinal splines on the secondary shaft. The gearing being in constant mesh, it follows that the primary shaft causes the outer coupling members to revolve on the sleeve or hub of the inner coupling members, but the motion cannot be transmitted to the secondary shaft until the inner members of one or other of the couplings are caused to engage with the inner faces of the outer members of that coupling and until, in fact, the neutral position is abandoned and either the ahead or the astern coupling is brought into engagement. Such engagement is effected by directing oil under pressure into the chamber between the inner members, which then





slide axially on their splines until they engage the outer members, where they are maintained in working contact by the oil pressure until it is released.

Disengagement after release of the working oil pressure is insured by the pressure oil also on the opposite face of the inner members, which returns them to their idling position. The pressure oil system consists of a pump, a by-pass valve, a control cock and ducts through which the oil passes at the correct volume and pressure to operate the couplings and to lubricate the working surface. The oil-operated couplings are engaged and disengaged by the simple and effortless action of turning the handle or lever of the control cock. This handle or lever on the control cock has three positions—ahead, stop, and astern. When the control cock is in the stop position, the ahead and astern oil-operated couplings are disengaged and revolve idly, or when the control cock is in the ahead position, the ahead coupling is engaged and the astern coupling is disengaged, and vice versa. The operation is positive and instantaneous, the time taken to operate from ahead to astern, and vice versa, being a matter of five seconds, and there is no possibility of more than one oil-operated coupling being in engagement at one time. On the trial trip here in Pittsburgh this afternoon, these gears on the *A. D. Haynes II* worked perfectly, both as to lack of noise and noticeable heat. The men up in the pilothouse were very enthusiastic because it gave them instant response to their power requirements. We anticipate that these Hindmarch-DeLaval reverse-reduction gears will prove very popular in this country because we have so many places where vessels of light draft are needed and yet

Ten feet in diameter, each propeller has five blades pitched to deliver maximum thrust per horsepower. Propellers are made of stainless steel, combining high tensile strength with corrosion resistance. Propeller shaft is 11½ inches in diameter.

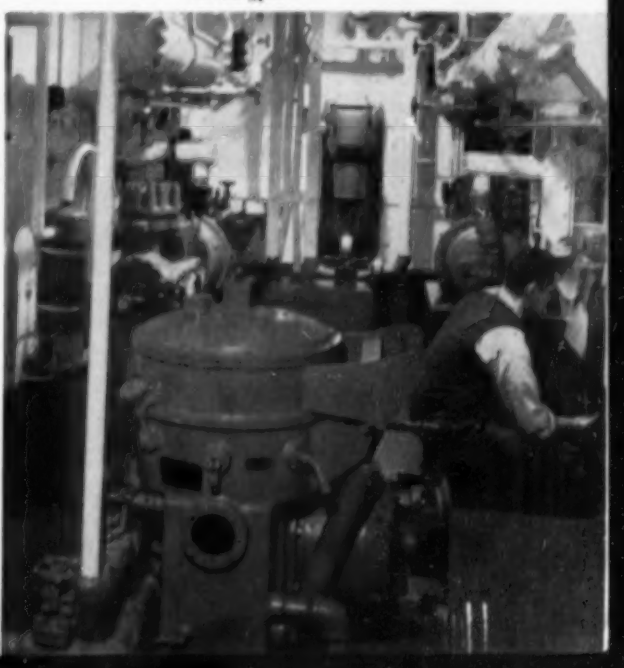
View showing Kort Nozzles on *A. D. Haynes II*. Comparison with two men shows the huge size of both the rudders, the Kort Nozzles and the propellers for this big ship.

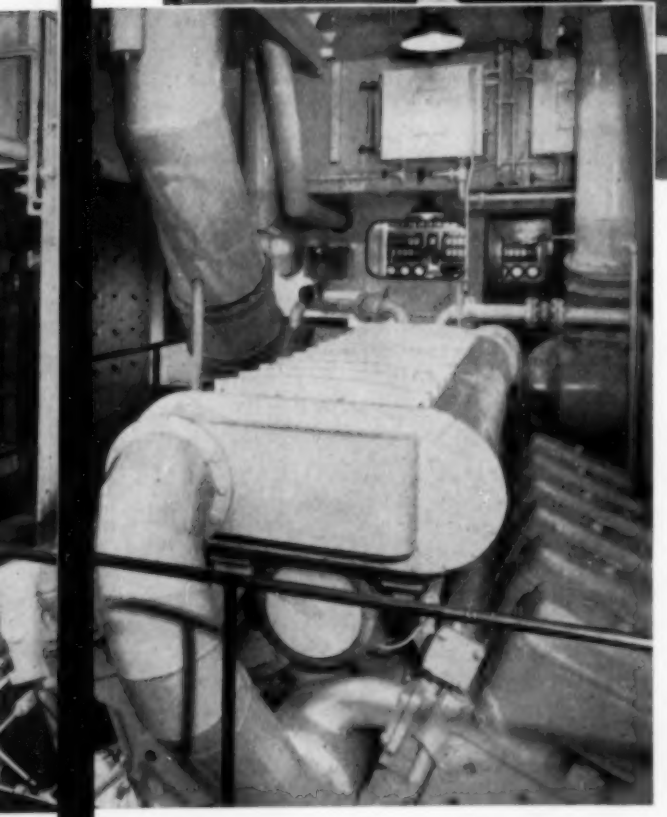
where a great deal of power is also required and these reverse-reduction gears make it possible to operate the engines at their most efficient speed and the propellers at their most efficient speed.

The handling of fuel for two big engines like this calls for the finest type of equipment and these two new towboats have it. The fuel oil is filtered through a 350-gallon-per-hour DeLaval centrifuge, drawing fuel oil from the bunkers and discharging into the 275-gallon day tank. As a matter of fact, this DeLaval unit has a top capacity of 550 gallons per hour. Then from the day tank the fuel oil passes through a Briggs four-unit fuel oil filter of the cartridge type.

Lubrication, of course, is a serious problem on big

Model 67-25 DeLaval diesel fuel oil purifier with a capacity of 550 gph. There is also aboard a DeLaval Purifilter for continuous purification of the diesel lubricating oil with a capacity of 400 gph.





A view of the two 12-cylinder Nordberg diesels with the console room in the background. Note the Elliott turbocharger on the right side of starboard engine.

Shop view of one of the Nordberg 12-cylinder 4-cycle diesels direct-connected to the Hindmarch-DeLaval reverse reduction gear. Note Massey governor in circle and Nugent duplex filters in center foreground.

Looking through a glass partition at the console where various instruments including a 50 point Brown electric pyrometer enable the operator to know exactly what is going on from stem to stern.

Instrument panel by Lake Shore Electric and one of the two Murphy generating sets direct connected to Electric Machinery generator.

boats of this kind with so much power in the engine room and called on for so many hours and days of continuous service. Make-up lubrication oil is carried in a 3000-gallon tank. Sump tanks are built into the engine room hull bottom and oil is drawn from them by pumps and put through a pair of large DeLaval Puri-filters for continuous purification of the lubricating oil at 400-gph capacity. These Puri-filters are the well-known DeLaval design coordinating the uni-matic centrifuge and the Fram Filcron filter all on the same base, all on the same line. The centrifuge, of course, does its well-known efficient job and then the oil passes on through the Fram Filcron filters which are single shell housing all cartridges. The net result on these two vessels is lubricating oil going back to the service tank in just about the same condition as it originally came from the refinery which happens to be the Socony-Mobil Refinery. Currently they are using No. 30 but probably will go on No. 40 as they add oil to the oil in present service.

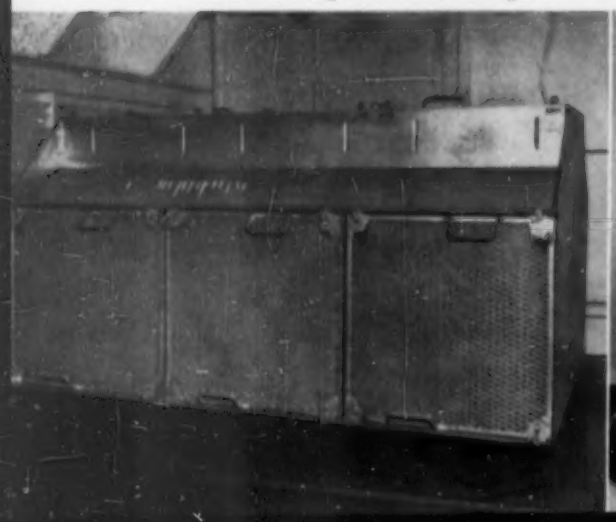
Before we leave the engine room and the equipment therein, a little word about the governors. Both engines are equipped with Massey governors which have quite a tough job to handle. Normally on a marine application of this type, the governor requirements are not too tough, but when the pilothouse calls for full reverse, those governors have to grab those engines and grab them quick and slow them down and correspondingly have to speed them up when the pilothouse calls for power and power quickly. The two Massey governors on these engines did a beautiful job here today on the trial run.

It is still somewhat of a novelty to find air cleaning equipment on board a river towboat, but obviously it should be an integral part of every ship operating on the Rivers. For instance, these boats we are talking about here will frequently be pushing barges loaded with coal, loaded with sulphur, loaded with all kinds of chemicals that will be blowing dust back and into the engine room and if the engines are not provided with good air cleaning equipment wear is going to start quickly. Then, of course, these towboats operate quite a substantial portion of their time in harbors of cities like New Orleans, St. Louis, etc., where the air content is not ideal for breathing into internal combustion engines, so it wasn't at all surprising to us to find that the two big Nordbergs on the *A. D. Haynes II* are equipped with American Air Filter panel-type filters, and, as will be seen by the illustration, the filters are located in a separate room up on the boat deck where the crew can get in at them, take them out, clean them, and put them back in again.

Each engine has its own air conditioning room or air filtration room, and each engine is assured of clean un-abrasive air, and the Mississippi Valley Barge Line is to be heartily congratulated on the far-sightedness in protecting their large investment in the engine room here by such efficient air filtration equipment.

The hotel load on ships of this size runs into a lot of power and the auxiliary generator room on board here is more than interesting. The two Murphy generator sets aboard are 144 kw continuous duty, 1200 rpm, 180 kva, 480 volt, 3-phase, 60 cycle.

Close-up of the three panel American Air Filter unit serving the port engine. A duplicate installation in its own room is on the other side of the boat deck servicing the starboard engine.



Close-up of one of the Briggs fuel oil filters located between the clarifier and fuel pumps.

Each Electric Machinery generator is driven, as we said, by a Murphy six-cylinder turbocharged diesel engine developing 216 horsepower at 1200 rpm. Generators are located in a separate, sound-insulated compartment ahead of the engine room, and the switchboard is on the port side of this generator room as indicated by the illustration. This switchboard was manufactured by Lake Shore Electric Co., Bedford, Ohio, who have built up a well-earned reputation for neat, compact design of instrument boards and instrument panels for shipboard use.

Getting back for a minute to the business-end of these ships, the two five-bladed 10-foot diameter stainless steel propellers are housed in Kort Nozzles of cast steel construction. A strut cast into the nozzle aft of the propeller supports the shaft. The strut bearing is a self-aligning roller bearing fitted with special seals and lubricated by a closed oil system. We show an illustration of the Kort Nozzles on the *A. D. Haynes II* and you can notice by comparing the size of the men with the size of the nozzles what a huge job this really is and how the Kort Nozzles divert the water to the propellers and hold it there until it has done its job. Furthermore, this construction of Kort Nozzles and propellers protects the propellers in shallow water and in some cases, we understand, the boats pull themselves over a mudbank without injuring the propellers or the shafting.

It will be interesting to note how the combination of comparatively medium speed, four-cycle turbocharged diesel rated 160 pounds bmep and direct connected to the propeller shaft through a Hindmarch-DeLaval reverse-reduction gear is going to work out in service on 200-foot towboats.

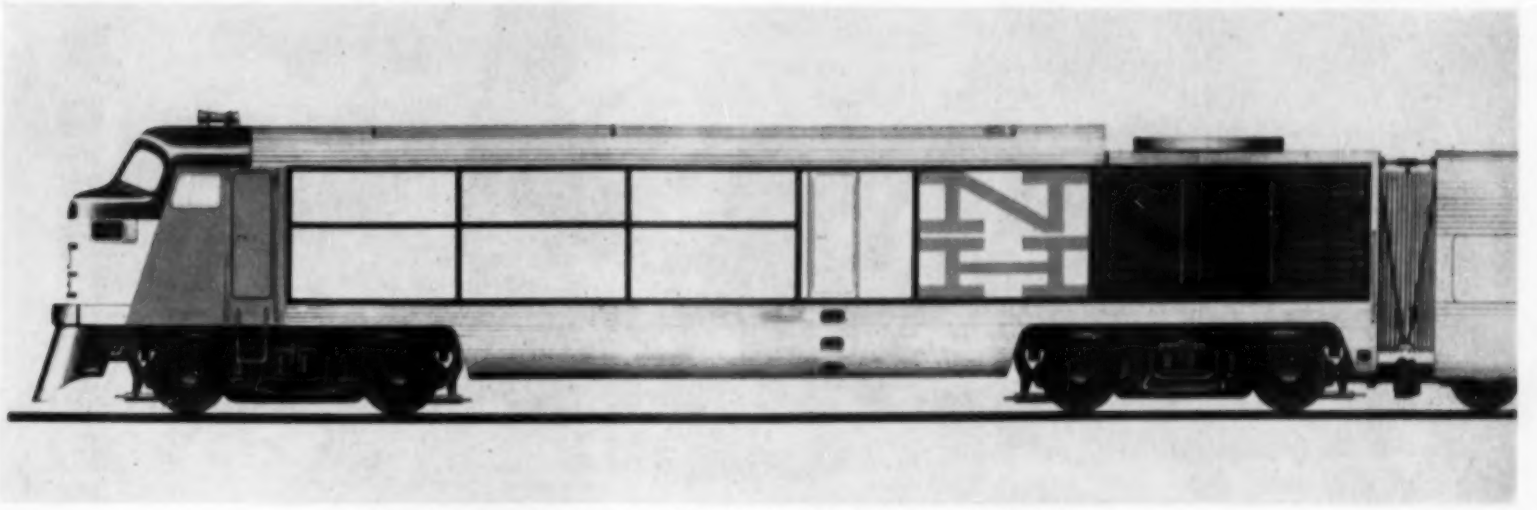
Smooth, quiet, efficient operation characterized every minute of the trial trip. A year from now we hope to be able to bring you a year's successful operation of the *A. D. Haynes II* and *Valley Transporter*, two very fine additions to a rapidly-growing fleet of diesel vessels on our Great Rivers.

List of Equipment

Main Engines—Nordberg Type FS-1312-HSC Supairthermal with DeLaval Turbochargers.
Reverse and Reduction Gears—M2WR-#10—DeLaval Steam Turbine.
Circ. Lube Oil Pump—DeLaval Steam Turbine.
Lube Oil and Fuel Oil Purifilters—DeLaval Separator.
Shell and Tube Jacket Water Coolers—Ross.
Generator Units—Murphy Diesel and Electric Machinery Manufacturing.
Air Whistle—Kahlenberg.
Water Filters—Cuno.
Kort Nozzles—General Steel Casting.
Air Conditioning—Trane.
Steering and Main Engine Controls—Westinghouse Airbrake.
Air Compressors—Gardner-Denver.
Switchboard—Lake Shore Electric.
Air Filters—American Air Filter.
Lube Oil—Socony-Mobil.
Tachometers—Weston.
Pyrometers—Brown.
Propellers, Stainless Steel—Avondale Marine Ways.

THE NEW FAIRBANKS-MORSE LIGHTWEIGHT, HIGH SPEED LOCOMOTIVE

Delivery of Fairbanks-Morse's New Lightweight Locomotive Will Enable The New York, New Haven & Hartford RR To Cut Running Time Between Boston and New York To Less Than Three Hours With Its New Streamliner



An artist's conception of the new Fairbanks-Morse "Speed Merchant" being built to provide power for the New Haven's Talgo-type lightweight, high-speed train.

By SIDNEY HOFFMAN

RAILROAD history of a sort will be made by the new Fairbanks-Morse diesel electric locomotives now being built for the New York, New Haven & Hartford RR. Since 1903, when New York City first required all lines coming into Manhattan to convert to electric power, a switch in locomotives has been necessary outside the city. The new units will be able to come directly into the city's Grand Central Station by changing from diesel-electric drive to taking power out of a third rail. The combination drive has been achieved by installing supplementary electrical control equipment and switchgear.

Designated the "Speed Merchant," the locomotives, working in pairs, will be capable of achieving speeds up to 112 miles per hour. Designed to haul the Talgo-type, lightweight train now being built by ACF Industries, Inc., the power units will have a number of unusual features which will contribute to improved service, better operating efficiency and increased economy.

The train will have no front or rear but will operate equally well in either direction. Nor will it have to be turned around at the terminal. Two identical locomotive units will be attached to the train, one at each end. Both will be controlled from either cab and will furnish the full complement of power whatever the direction of travel.

An 8-cylinder standard F-M opposed-piston diesel will provide all power requirements including lighting, air conditioning, heating and food service, eliminating the auxiliary engine-generator. At least 1200 hp of the total 1720 hp will be available for traction. The two units will thus provide at least 2400 hp for continuous motive power.

Dirt, dust, grit and sand always surround a moving train. The usual means of keeping these injurious elements out of the engine is to mount an air-intake filter for the engine on the roof. The "Speed Merchant" will place the entire engine room under slight pressure. Thus reversing the cycle and eliminating any leaking in of unfiltered air.

The "Speed Merchant" will be a fast, light, economical unit. Approximately 57 ft. long, 10 ft. wide and 12 ft. high, each low center of gravity locomotive will weigh about 100 tons as against the usual 125 to 160 tons. A slight step-down of the roof at the rear to 10 ft. 10 in. will meet the roof line of the train. Each locomotive will be mounted on two four-wheel trucks with one truck powered and the other an idler. In addition to a standard coupler at the front end for yard switching, an unusual, completely automatic coupling system between power unit and train is at the rear. The time saver will contain all necessary M.U. connectors to train-line both locomotive functions and servicing power. Coupling the locomotive to the train instantly couples all lines. Modern lightweight braking equipment, Westinghouse Air Brake Company's No. 26 air brake system with composition-type brake shoes, will contribute to more braking effort and lighter weight.

The Talgo-type train is one of three low-slung lightweight trains ordered by the New Haven road. The others are the "Train X" being built by the Pullman-Standard Car Manufacturing Co. and a tubular train from the Budd Company. The "Train X" will be powered by a Baldwin-Lima-Hamilton locomotive and the Budd train by a 300 hp diesel at each end of the train. These engines will be controlled by the engineer from special cabs at either end of the train.

In addition to the Fairbanks-Morse locomotive which, incidentally, is said by the manufacturer to be the most powerful locomotive to be designed for lightweight trains, the New Haven has an order with General Motors for EMD lightweight diesel locomotives of the type which was exhibited at GM's recent Powerama in Chicago.

When New Haven's new Talgo-type lightweight, high-speed train powered by two F-M "Speed Merchant" locomotives goes into service it will cut travel time between New York and Boston to less than 3 hours. This will place it in direct competition with air travel (including time going to and from airports) between those cities. The added speed and comfort is almost certain to also cut into automobile travel along its route.

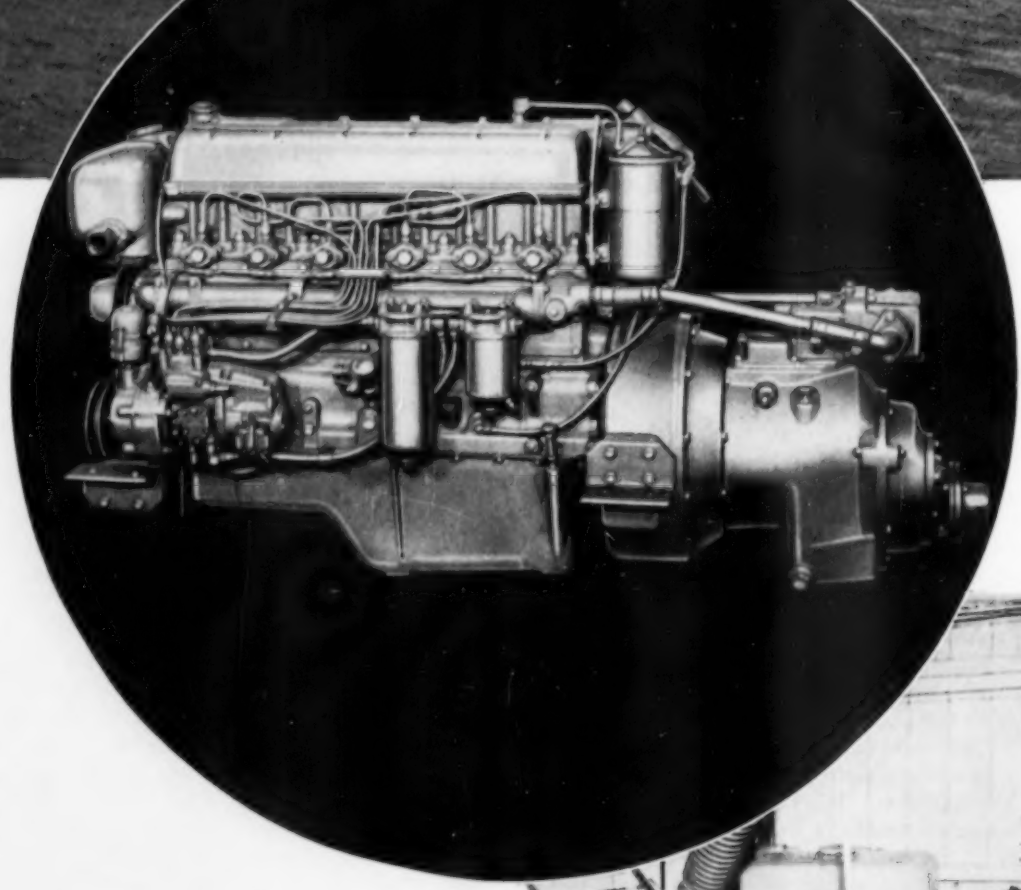
NEW LINE O

The *Grayling*, a 42-ft. Correct Craft Miamian, powered with twin Graymarine 6D-427 diesels, backed by 2:1 reduction gears.

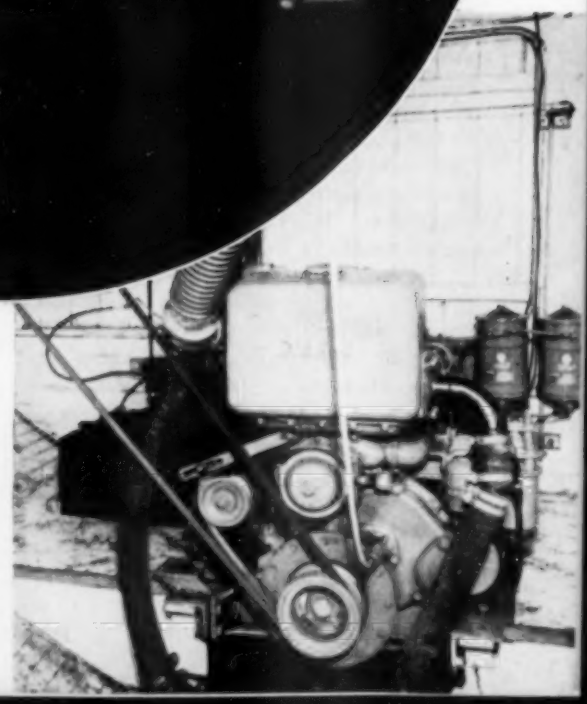
FOR the past 17 years, the Gray Marine Motor Co. has been active in the diesel field. The company specializes solely in the design and production of marine engines. During World War II, Graymarine diesels were adopted by the U. S. Navy as standard power for the LCVP, LCM, LCT and other landing craft. A total of about 55,000 units aggregating eleven million horsepower was delivered during this wartime period.

Recently, Graymarine has introduced a new line of marine diesel propulsion units which feature lightweight, simplified construction, and compactness. The development of these engines was stimulated and accelerated by requirements of the U. S. Navy and U. S. Coast Guard for lightweight small diesels. The engines are supplied also for installation in life boats, and sold by Graymarine distributors around the world for commercial uses.

These features—lightweight, simplicity, and compactness—represent the main trend of Graymarine engine design. This has been accomplished in part by the extensive use of aluminum castings, and was made possible by the use of a fresh water cooling system which is standard on all the Graymarine diesels. Heretofore, water-jacketed exhaust manifolds on marine engines have been almost exclusively made of cast iron because of its greater resistance to salt water corrosion and electrolysis. On



The 100-hp Graymarine, Model 6-D427, shown with Paragon hydraulic transmission and Bosch PSB fuel pump.



Graymarine Model 6-D427 in a 38-ft. lobster boat owned by Wesley Bracey, Cranberry Island, Me. Note dual Fram oil filters.

E OF GRAYMARINE DIESELS

Fuel System, Cooling Water Circuit, and Transmission All Have Been Redesigned to Contribute Toward Compactness, Simplicity, and Increased Horsepower Per Pound

By BRUCE W. WADMAN

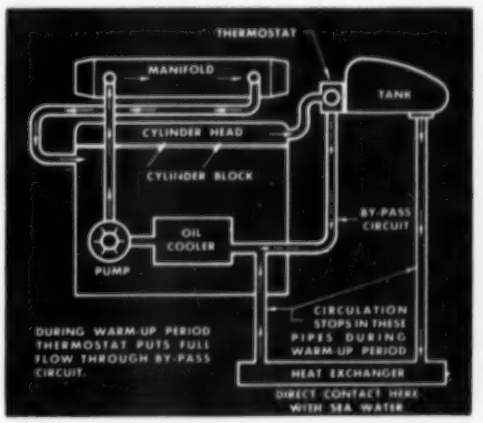
these new engines the water jacketing of the exhaust manifolds is on the fresh water cooling circuit, and the manifold is a one-piece aluminum casting. The fresh water within the engine's internal system is circulated by a centrifugal pump, and cooled by indirect contact with sea water through a heat exchanger, either of the outboard or inboard type. The outboard type, known as "keel kooler," is standard equipment.

At the time these diesels were in the planning stage, it was found that, to take full advantage of weight-saving possibilities, it was necessary to design new transmissions. It was decided these should be tailormade to the engines, eliminating undesirable bulk and weight. This was accomplished by close cooperation between the Gray engineering department and the transmission manufacturers. Both Paragon and Snow-Nabstedt supplied new transmissions to meet the requirements of these engines.

Further increase in horsepower per pound was accomplished by higher speeds and utilization, in some models, of the Bosch PSB single-plunger fuel pump and the Roosa-Master opposed-plunger, distributor-type fuel pump. Both of these pumps are much lighter than previous types of fuel pumps used. It is important to point out that weight has not been sacrificed where mass and strength are required. For example, no weight reduction has been taken in the cylinder block, which is cast in one piece of alloy grey iron.

The development of modern, high-speed, lightweight diesels like these Graymarine engines, gives better performance to boat owners by increasing cruising speeds, even approaching the speeds delivered by high output gasoline engines. This advance also makes possible the application of diesels to smaller and smaller boats, both commercial and pleasure. In work boats, especially, this weight and size reduction of the engine power unit allows more cargo capacity, with more profitable operations.

All Graymarine engines are of the solid injection, four-cycle, valve-in-head type, with compression ratios ranging from 15:1 to 16:1. Newest model in the line is the 129 cu. in. size, on which shipments started in March, 1955. Under development also is an 802 cu. in. model which will have a continuous duty rating of about 200 hp. It is scheduled for release later this year. All the diesels feature the energy cell type combustion chamber of the Lanova design, which reduces peak pressures and provides smooth combustion.



Schematic diagram of the fresh water cooling circuit designed for the new line of Graymarine engines.

Graymarine now produces six diesel sizes. The table below gives the specifications of these engines. Model names designate the piston displacement in each case.

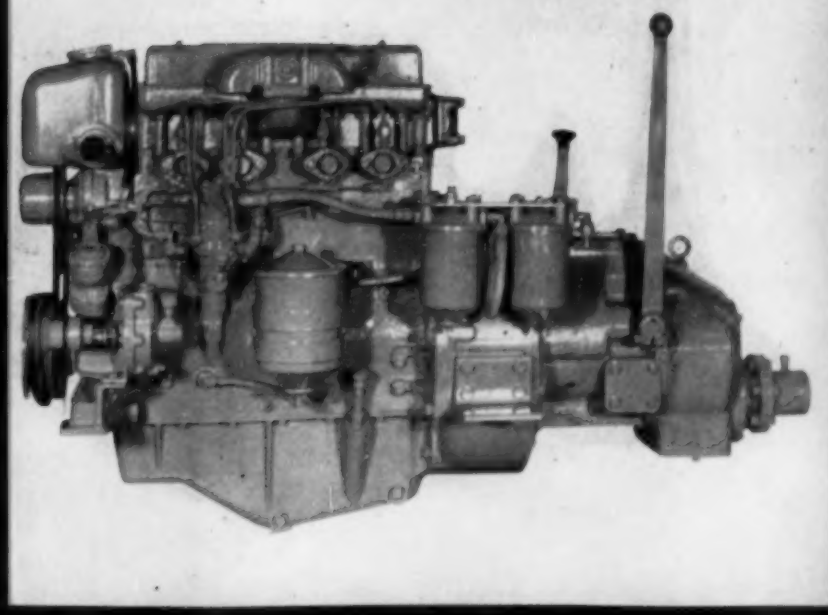
Model	Continuous HP Rating	Top RPM	Wt. Incl. Transmission
Four-D129*	25	2000	670 lbs.
Four-D157	30	1800	1100
Four-D181*	50	2400	802
Four-D260	50	1800	1400
Six-D427*	100	2200	1475
Six-D572	135	2200	2510

*Indicates lightweight construction.

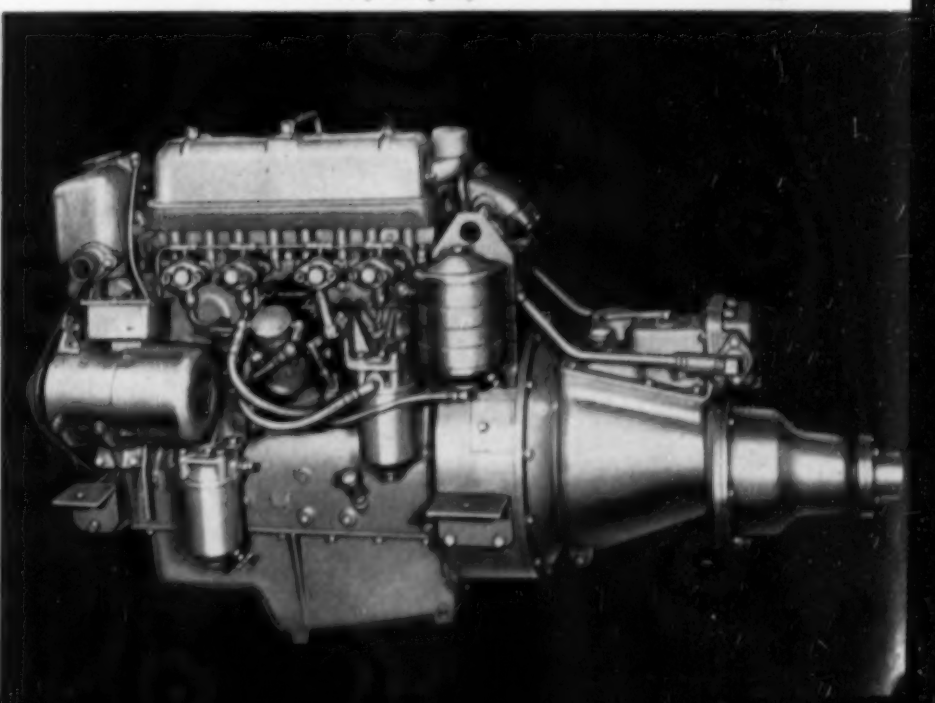
All the above ratings are for continuous horsepower. If intermittent horsepower ratings were used, the figures would be higher. To maintain these continuous-duty ratings, consider the 100-hp engine, for example. It uses Bosch fuel injection pumps, types APE or PSB. A small wedge-shaped torque plate is contained within the governor, which automatically reduces fuel when load demands call for an output in excess of normal propeller load. A cam nose, linked to the throttle, rides against this torque plate, automatically limiting fuel in accord with actual load requirements.

For all engines, Gray Marine publishes performance data sheets showing curves for propeller load, horsepower, torque and fuel consumption in U. S. gallons, at all engine speeds.

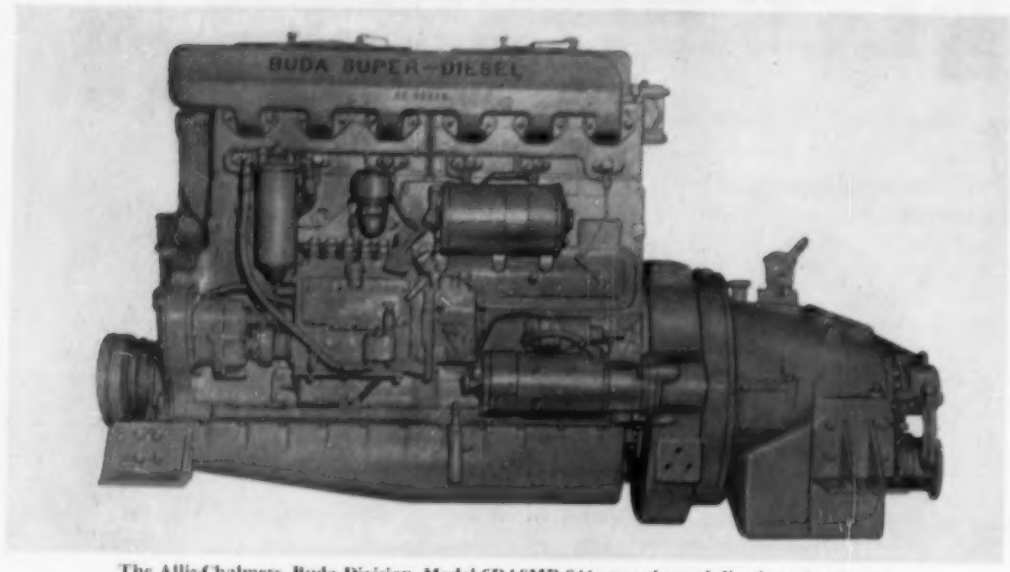
A Snow-Nabstedt transmission is shown on this Model 4-D129 Graymarine diesel. Marine gear makers cooperated with Graymarine engineers to reduce weight in the new line.



The 50-hp Model 4-D181 Graymarine with Paragon hydraulic transmission, with a drive ratio of 2.04:1, and a Roosa-Master fuel injection pump.



The A-C Exhibit At The Boat Show



The Allis-Chalmers, Buda Division, Model 6DASMR-844 supercharged diesel marine engine. This 6-cyl. engine develops a maximum of 280 hp at 2100 rpm.

BUDA Division, Allis-Chalmers Manufacturing Co., Harvey, Illinois, is exhibiting 3 marine engines and a marine generator set at the 46th Annual National Motor Boat Show in New York City, January 13-22nd. The new models that are being emphasized include:

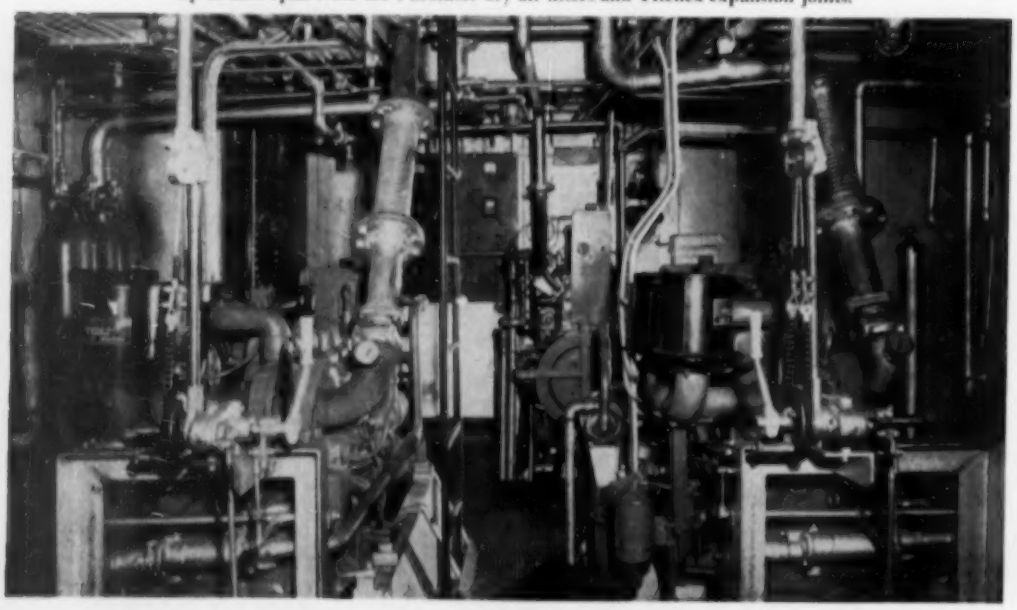
Model 6DAMR-273 diesel marine engine. This engine is a six cylinder, full diesel that weighs approximately a thousand pounds complete with marine gear. It is ideal for operation of pleasure craft, light and fast motor boats in size 26 to 60 ft. in length. Model 6DASMR-844 diesel marine engine, heavy-duty, light weight, diesel ideal for high speed boats, six cylinders and develops maximum horsepower of 280; Model 8DATMR-1125 turbocharged marine diesel which develops 300 shp at 1900 rpm. This is ideal for powering offshore boats, fast work boats, etc.; and Model BDM-6 6-kw marine-type diesel electric generator set. This is one of many sizes and models of generator sets available in sizes 5 to 300 kw. It is used for all types of auxiliary lighting and power.

"Maid of the Mist"

MILLIONS of visitors to Niagara Falls have taken the unusual boat ride in the turbulent waters below the falls during the past fifty years. A ride in the *Maid of the Mist* is one which is not easy to forget. Early in 1955 when the two famous boats were being readied for the season's operation a disastrous fire put them out of service. The first *Maid of the Mist* was built in 1885 at the Maid of the Mist Steamship Company's slip below the falls, at Niagara Falls, Ontario. It was designed to carry 150 passengers. Seven years later a second vessel was built at the same site and carried about 100 passengers on each trip. Together the "Maids" carried about 5,000 people daily at the height of the season.

Operating every day during the summer season of 1955, the *Maid of the Mist III* has completed what her owners term a period of "excellent service."

Twin JT-6-M Cummins Turbodiesels power the *Maid of the Mist III* with a total of 324 hp at 2200 rpm. Note the Purolator dry air filters and Titeflex expansion joints.



To design and build a new *Maid of the Mist* presented many problems. Russel-Hipwell of Owen Sound, Ontario, with considerable experience in this type of vessel, submitted a design to meet the unusual needs of this service. Changing water levels, rocky shoals, swirling currents and instant control were some of the problems. Twelve weeks after the fire, the *Maid of the Mist II* was launched and ready for service. In this time the design was completed; the vessel pre-built 180 miles away at Owen Sound; the sections moved by highway to the Niagara gorge; and the complete boat assembled and tested.

The new vessel carries 100 passengers every trip, and is 66 ft. overall with a moulded beam of 16 ft. Being all-welded steel, the one main deck is more roomy than the earlier boats and passengers now get a better all-round view of the spectacle.

Steam has given way to diesel. Twin Cummins JT-6-M Turbodiesels were selected, each furnishing 162 horsepower at 2200 rpm to turn four foot propellors. A Snow-Nabstedt gear with a reduction of 4.5 to 1 is being used in this installation. The combined 324 horsepower drives this vessel safely through the rushing waters. The owners report the performance of the Cummins Turbodiesels, after a season's operation, to be excellent. Auxiliary electric power, bilge and fire pumps, are driven by a separate 18 horsepower Lister diesel engine, and a Steelcraft electric-hydraulic steering system gives instant response to the twin rudders. All machinery controls are operated from the wheelhouse.

This new *Maid of the Mist* provides the ultimate in safe operation for the millions of passengers who in the years to come will take this unusual ride.

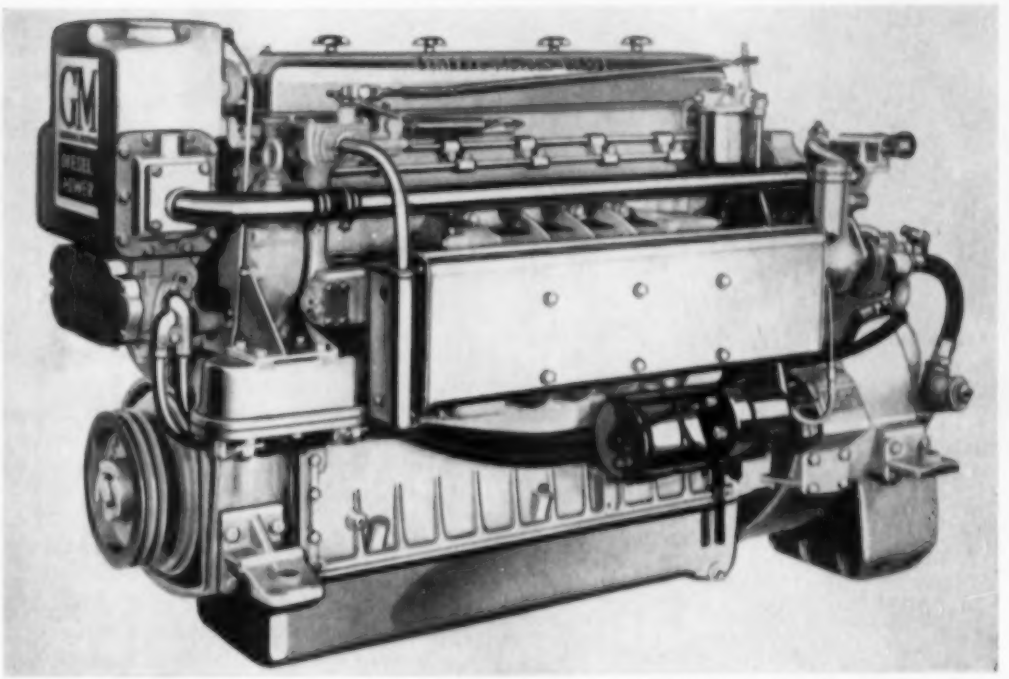
New Lighter-Weight Engine at Show

A new General Motors diesel engine which weighs less than ten lbs. per hp is a featured display in Detroit Diesel Engine Division's exhibit at the 1956 National Motor Boat Show. This engine and other diesels ranging from 87 to 300 hp in the Division's exhibit emphasize the low weight-to-horsepower ratios achieved in Detroit diesel engines largely through GM's two-cycle design.

The new model on display is a 6-cylinder vertical unit in the "71" series which develops up to 235 shp at 2300 rpm. Its low weight-to-horsepower ratio is attained through the liberal use of aluminum alloys in addition to its two-cycle design. The engine is especially suited for use in yachts, crew boats, patrol boats and other high-speed vessels. Four-cylinder and twin-six vertical aluminum models have also been added to the Division's "Series 71" line.

General Motors' compact, heavy-duty diesel, the "6-110," with front power take-off is also on display. This engine is rated at 289 shaft horsepower for large pleasure craft and crew boats and has a continuous rating of 220 shaft horsepower for large fishing craft and work boats. The smallest diesel unit in Detroit Diesel's exhibit is the "4-51" valveless engine which is being installed in pleasure craft as small as 22 feet.

Completing the Detroit Diesel exhibit is a motorized cutaway model of a GM "3-71" diesel which shows the various parts of the engine in motion. It is a dramatic display illustrating the GM 2-cycle principle of operation.



General Motors new 235 shp vertical diesel of the "71" series. Through the liberal use of aluminum alloys this engine has a weight of less than ten pounds per horsepower.

Dependable Marine Diesels

HIGH-SPEED diesel engines in the 30 to 500 hp range have been winning new responsibilities among pleasure, work, and fishing craft owners due to their reliability and economy. Among the diesel engine manufacturers who have met with success in the marine field—both for original installations in new boats and as replacement engines for other types of power—is the Hercules Motors Corp.

In the workboat field, a typical and interesting example of a Hercules marine diesel installation is the harbor tug, *Ray-K*. This is a repowered job, two Model DFX Hercules diesels now providing power for the vessel. The *Ray-K* is unique in that it was among the first to be equipped with the Allgire Rudderless drive. This invention allows the propellers to turn 360°, thereby eliminating the need for a rudder. This design has been in use for several years and has proved successful in ocean harbors and on the inland waterways.

The Hercules Model DIX6ES 150-hp, 6-cylinder diesel has proved quite popular in the luxury pleasant class. A typical example of a pleasure boat equipped with two of these 150-hp engines is the *Helen M II*. She is a 1955 Chris Craft Constellation of 53-ft. length.

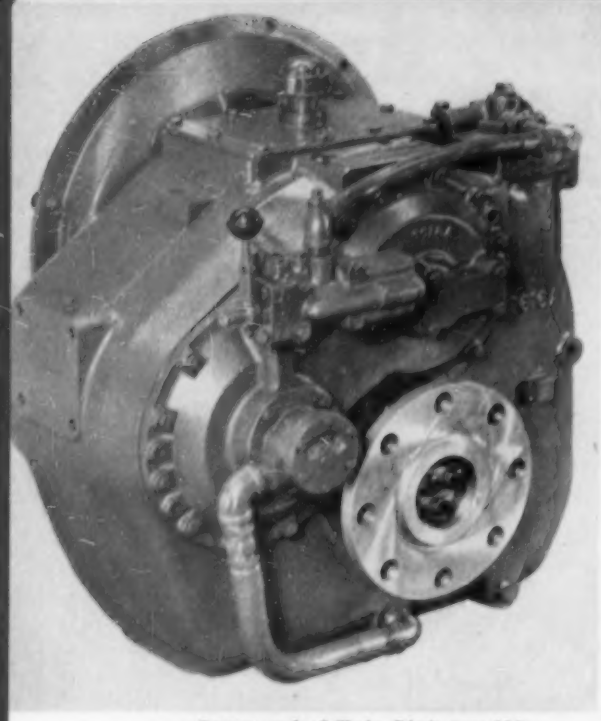
Another popular Hercules marine engine is the 118-hp Model DIX6ES. A number of these have been placed in shrimp boats, some of them in the supercharged version which delivers 150 hp. Such an installation was made in the Cuban vessel, *Godeca*, reported in detail in DIESEL PROGRESS, February 1955.

The *Helen M II* is powered by 2 Hercules 150 hp marine diesels. She is a 53 ft. craft and is presently on an extended cruise.

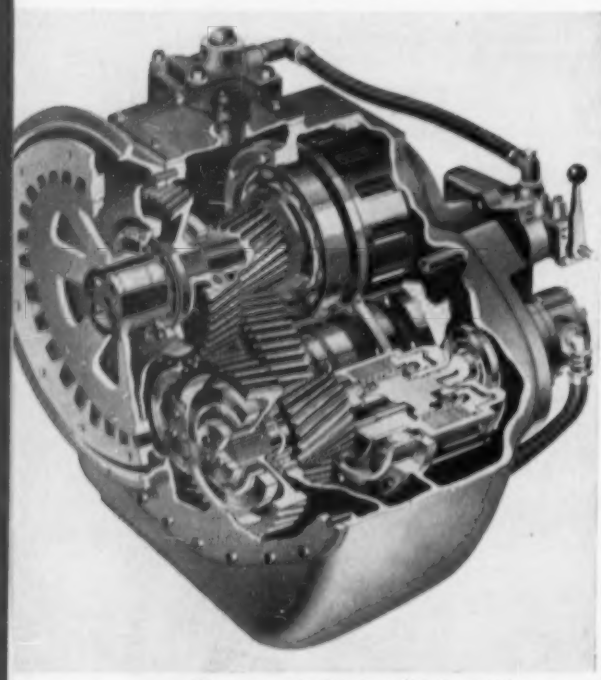
The *Ray-K*'s two Hercules engines went into service late in October 1953. They have been working 16 hours a day, 7 days a week with no down time.

NEW TWIN DISC MARINE GEAR

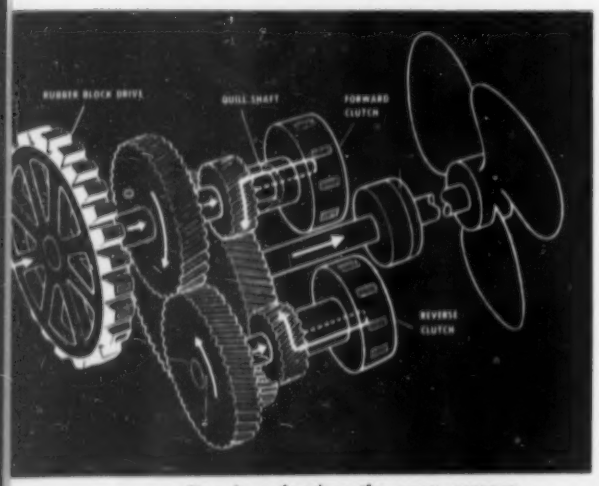
By DOUGLAS SHEARING



Output end of Twin Disc's new MG-511 marine gear which has been designed for higher speed, higher horsepower marine engines of up to 240 hp at 2100 rpm.



Three-quarter cutaway drawing of the new MG-511 marine gear.



Drawing showing the gear arrangement of the Twin Disc MG-511 marine gear.

THE Twin Disc Clutch Co. announces a new marine gear, Model MG-511, which was designed to meet today's trend toward higher speeds and higher horsepower in marine installations. It is built for engines of up to 240 hp, turning at 2100 rpm. Company engineers state that their new reverse-reduction gear takes up a minimum of space in the power train, provides faster than usual response with "finger-tip" control, and is exceptionally easy to service.

The MG-511 has an arrangement of five carburized, hardened and ground helical gears, straddle mounted on short rigid shafts—plus hydraulically actuated clutches. Thus it is only 17⅞-in. from the SAE housing flange to the output propeller shaft flange. Anti-friction bearings and SAE involute splines are used throughout. Input is through a rubber block drive—which is being used successfully in other Twin Disc marine gears, torque converters, fluid couplings and clutches. This drive will withstand normal misalignment conditions, officials say, without imposing undue loads and stresses on the marine gear input shaft or the engine crank shaft.

Clutches are actuated by 140 psi oil pressure, furnished by a 10-gpm pump, driven by the marine gear reverse shaft. A large pump was selected, since in addition to actuating the clutches, oil is directed into the heart of each clutch through the inside diameter. This flood of oil carries away heat gives smooth clutch engagements and substantially reduces clutch plate wear. In addition, oil is also pumped to provide forced feed lubrication of meshing gears. Smooth engagement and disengagement of the forward and reverse clutches is accomplished through a differential mechanism in the selector valve. This permits a steady rise of actuating oil pressure from 30 psi to the maximum of 140 psi in even increments in only ¾ to 1½ seconds. Forward, neutral, and reverse are obtained with the selector valve.

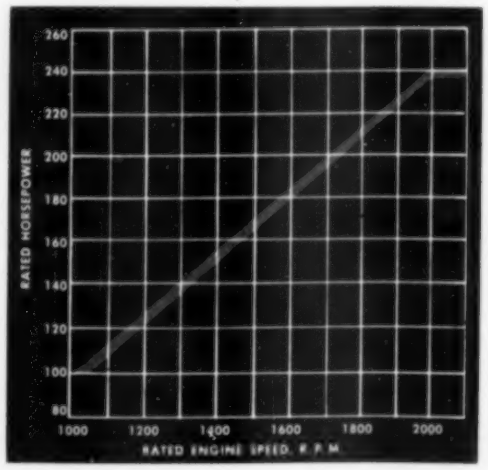
The MG-511 is designed for full horsepower operation continuously in both forward and reverse output shaft rotations. Thus, the gear is suited for twin-engine installations of right-hand engines—or it can be adapted for left-hand engines by changing the oil pump. The clutches are located at the extreme after end of the gear, and removal of the cover plate cap allows ready access to the clutch driving plates for easy and speedy clutch plate replacement—without first disassembling the gear from the engine. The pump is serviced just as easily, since it plugs into the reverse shaft and is held in position with four cap screws. Adequate inspection plates are provided for servicing other components.

A trolling valve—an optional accessory—is available. It is mounted in the hydraulic system between the selector valve and the forward clutch. The trolling valve is basically a relief valve with a manual control over the relief valve spring. By initially moving the trolling valve, the oil pressure in the forward clutch cylinder can be dropped automatically from 140 psi to 40 psi. Further manual movement of the trolling valve is possible, allowing oil pressure at the clutch piston to be regulated in minute increments from 20 to 40 psi. This, in turn, causes the clamping pressure across the clutch plates to vary correspondingly. The lower the clamping pressure, the less the clutch torque. The clutch will then slip, permitting maintenance of very slow propeller speeds for slow boat speeds as required in some fishing operations.

The gear housing is cast with integral mounting pads so that it can be supported on the engine bed rails. The output shaft turns in Timken roller bearings, chosen to take the full propeller thrust without the addition of external thrust bearings. Because of the double lip seal on the output shaft, the designer says that bilge water can't penetrate the gear, and that oil can't leak into the bilge.

Lubricating oil is cleaned by a filter placed on the pressure side of the pump. The filter is provided with a by-pass to prevent loss of oil flow, should the filter become clogged due to neglect.

Specifications for the new MG-511 marine gear: ratios, 4.4:1, 3:1, or 2:1; over-all length: SAE housing flange to output propeller shaft flange, 17⅞ in.; weight: 950 pounds; oil capacity: without heat exchanger, 5.5 gallons; oil pump: 10 gpm, driven by reverse shaft; flywheel housing: SAE No. 1; connection to flywheel: rubber block drive fits flywheels machined to standard 14 in. over-center clutch dimensions; trolling feature: optional at extra cost, can be mounted in the hydraulic system between the selector valve and the forward clutch; reverse speed: same ratio forward and reverse.



Dragger "David Francis"

IN Nova Scotia, there's a new 65-foot dragger, the *David Frances* that's being talked about with real respect. Her original designed capacity was 75,000 lbs., of iced fish, but her catches have been running to 85,000, 89,000 and a whopping 91,000 lbs., giving her owners increased satisfaction with each succeeding trip. Talk has begun to work its way up and down the coast from Lunenburg, that since she has been bringing in such "Goliath" loads from her 64 ft. 10 in. hull, a more descriptive name would be *Little David*.

The big reason for the *David Frances'* remarkable loads is her equipment and construction. She is powered by an Atlas Imperial diesel, delivering 195 continuous hp at 1225 rpm. Edward Hansen, her captain, is especially pleased with the ease of handling and ample reserve of power that the Atlas engine provides. The craft was built at Lunenburg's famous Smith and Rhuland yards. The engine pushes a 64 ft. 10 in. hull which was lengthened from a 60 ft. dragger design by Eldredge-McInnes. Changes were made on permission of the Canadian Steamship Inspectors and the Fisherman's Loan Board to enlarge the wheelhouse, to construct hull of native hardwood, to add a forecastle head and to increase the length. The engine was built in the plant of White Diesel Engine Division of Springfield, Ohio with delivery accomplished by their Halifax branch. She's rigged with gear for fishing both sides and can handle a scallop drag instead of her trawl when the market and season is right.

With the Atlas main engine in the compact engine room, is a Lister FR-1 radiator cooled auxiliary unit with a 3 kw generator, a Quincy air compressor and a 2 in. Marine Products pump. The Atlas Model 35 is fresh water cooled with a heat exchanger. The engine alarm system is connected to a pilot house station. Simple heavy duty construction of the modern Atlas allows easy servicing and features like individual fuel pumps, duplex fuel oil filters, and multiple lube oil filters insure continual operation in the heavy Atlantic waters.

Designed to haul a maximum catch from the banks at a respectable cruising speed, and to be handled easily from the bridge, the dragger *David Frances* has made her owners proud of the equipment they specified.

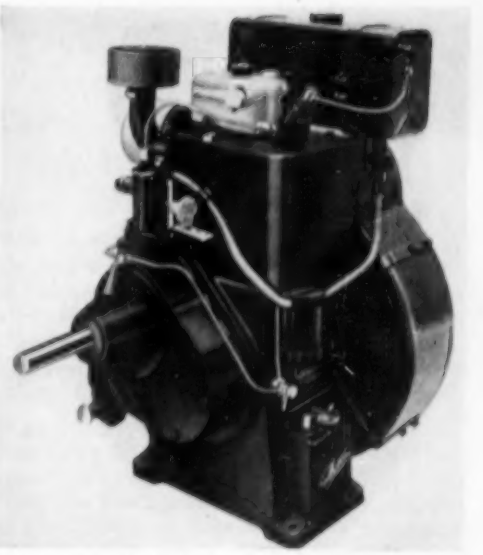
The Petter Engine Display

THE Petter Diesel Engine Division of Brush ABOE, Inc., Woodside, L.I. are exhibiting their marine engines again this year at the New York Motor Boat Show. For the 30 to 46 foot class of small boat, Petter will display their AV2M engine, which develops 10 hp at 1500 rpm continuously. This water cooled diesel is complete with forward and reverse gear box and an optional 2:1 reduction drive.

Petters also plan on showing their model PAZ1M, which develops 2½ hp at 1500 rpm continuous rating and weighs only 340 lbs. This marine diesel engine starts easily by hand from cold, will operate below deck in ambient temperatures of up to 125°F and runs full load on a gallon of fuel oil for over 6 hours. A Paragon forward and reverse marine clutch and a variable speed control is part of the PAZ1M package. The Petter PAZ1 single cylinder, 4 stroke cycle air cooled diesel developing 3 hp at 1800 rpm will again be on display.

Of particular interest this year on the Petter stand should be their line of diesel generating sets, geared to the needs of the commercial fishing industry. Their 1500 watt, dc 32 volt battery charging set is powered by the Petter PAZ1 engine. The generator on this unit is flange mounted and provision is made for a belt drive off the front end for a bilge pump or small compressor.

Also expected to be shown is a 3000 watt ac diesel generating set using their AVA1 diesel engine. The generator for both the 1500 and 3000 watt sets is manufactured by the Winpower Manufacturing Company of Newton, Iowa. These units have found great interest and use with the shrimping fleet and commercial fishermen generally. At the 1956 Boat Show, Petters plan to have on their stand an item of particular interest to boat owners looking for auxiliary power. This is a 60 cycle ac generating set incorporating a 6 hp Petter AVA engine coupled to a Permanent Magnet generator.



The Petter PAZ-1 which develops 3 hp at 1800 rpm.

Jabsco Pumps at The Show

THE Jabsco Pump Company display at the Boat Show will show special self-priming marine engine pumps, foot and flange mounted models for raw water cooling on marine engines now produced by the leading marine engine manufacturers. Also included will be a display of the standard line of self-priming rotary pumps with the neoprene impeller in bronze construction, both plain and ball bearing models. Sizes ¼ in. to 2½ in. ports with capacities of 2 to 135 gpm.

The display will also include mechanical and manually operated demonstration units, showing operating functions of various models.

Gulf Coast Diesel Notes

By Michael T. Pate

GLASER CONSTRUCTION Company, Lafayette, Louisiana, has bought through Cummins Sales & Service, Inc., Fort Worth, Texas, a model NHRBIS Cummins diesel, rated at 300 hp, which will be used to power a generator used for pipeline welding in the field.

C. J. TRAHAN, Inc., Shreveport, Louisiana, has bought through Stewart & Stevenson Services, Inc., Houston, three GM quad-6 series 71, 3 diesel units which will be used as prime power on an oil-well drilling rig. Each unit is rated at 600 hp.

TEXSTEAM Corporation, Houston, has bought from the Diesel Division, Fairbanks, Morse & Company, a model 45B3 ¼ dieselized unit, rated at 5¼ hp. The diesel will be used for pump drive.

J. P. AND L. G. BROUSSARD, Morgan City, Louisiana, have bought from Stewart & Stevenson Services, Inc., of Houston, three 6-cylinder series 71, GM diesels, each equipped with 1½:1 hydraulic reversing and reduction gears. A matched pair of these diesels will power a twin-screw crew boat, the other used in a single screw boat.

COLFAX LUMBER & Creosoting Company, Pineville, Louisiana, will repower a derrick crane with a model HRCIP-400, 110 hp Cummins diesel, secured through Cummins Sales & Service, Inc., Fort Worth, Texas.

SAN ANTONIO Machine & Supply Company, San Antonio, Texas, has bought from Waukesha Sales & Service, Inc., of Houston, two model 135DKU Waukesha diesels, rated 100 hp at 1800 rpm.

GULF OIL Corporation, Export Division, New York City, has acquired a Stewart & Stevenson model 20D.A. oil-field unit, powered by a GM series 71, 2-cyl diesel, connected to a 20 kw dc generator. The unit includes direct-current motor drives for a 17 cu. ft/min air compressor, a 1½ in. wash-down pump (centrifugal), rig lighting, shale shaker, bug blower, and drilling rig auxiliaries.

BIG STATE Barging Company, Houston, has bought from Mustang Tractor & Equipment Company, Houston, two model D397 Caterpillar marine diesels, rated 450 hp. each. They are being installed in the company's new towboat by the builders, Calmes Engineering Company, Houston.

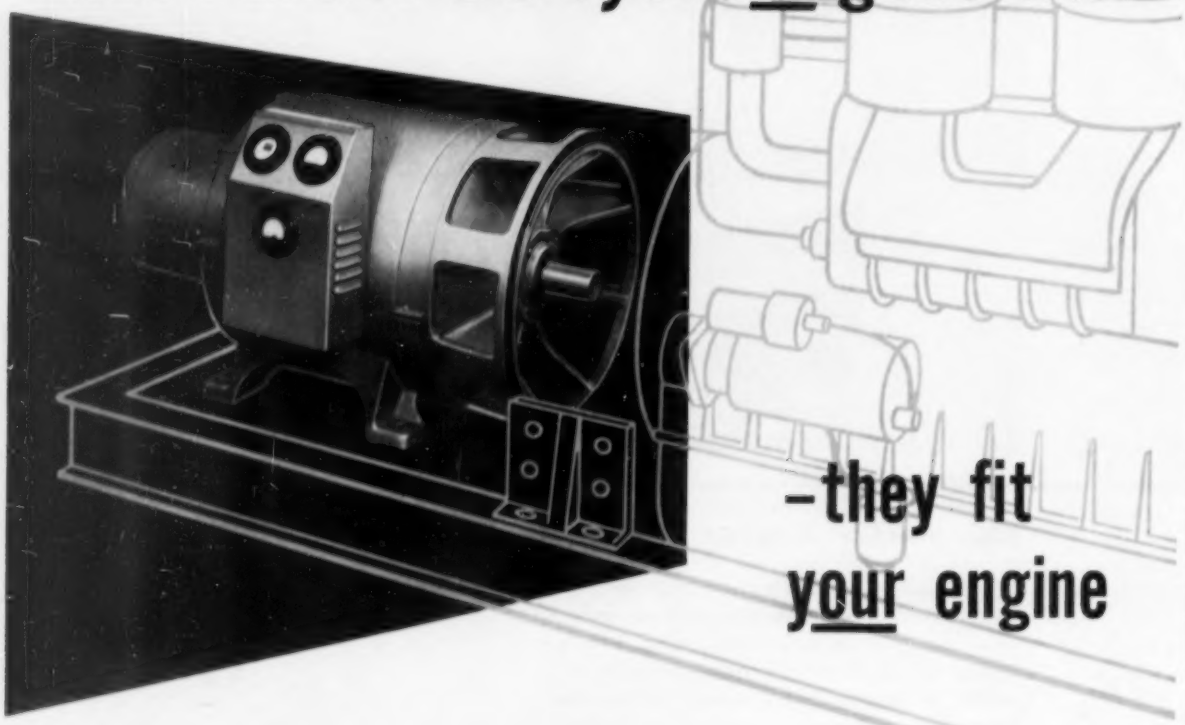
PANAMA-WILLIAMS Company, pipeline contractors of Houston, have bought from Big 3 Welding Equipment Company, Inc., of Houston, two 250 ampere welding generators, each powered by a model DIX4D four cyl Hercules diesel, rated 40.5 hp. continuous.

EDWARDS TRANSPORTATION Company, Houston, has bought through the Diesel Division, Fairbanks, Morse & Company, ten model 45B4 ⅛, diesel generating sets, rated 6 kw. each.

INLAND RIVER Company, New Orleans, Louisiana, has bought through Cummins Sales & Service, Inc., Fort Worth, Texas, two model VT-12-M Cummins diesels, rated at 600 hp. each. These will be used as main propulsion drive in a towboat being built by Levingston Shipyard and to be a sister ship to the *Rebel Warrior*, owned by the Black Warrior Towing Company.

BROWN & ROOT, Inc., Houston, have purchased from Mustang Tractor & Equipment Company, Houston, a 200 kw. diesel electric set, to serve as main power source for a remote operation. The set is powered by a model D375 Caterpillar diesel.

New Inet-Palmer 60 cycle ac generators



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Here's the ideal "other half" for a 60-cycle power plant . . . INET-Palmer's new, completely redesigned Series 60 A-C Generators. Flexible, they hook up to *any* standard engine—diesel, gasoline, butane, or natural gas—deliver *precise* 60-cycle power under even the roughest operating conditions. Rugged and dependable, their basic features have been proved by 25 years of desert, oil field, marine, and similar "tough" service. Unusually stable during motor starting, Series 60 A-C Generators are subject to only extremely small voltage dip. Recovering almost instantly, they cause no lighting dimout, service interruption, or motor damage. Series 60 units are normally Auto-Regulated but are also available with external regulation.

INET-Palmer's new catalog on 60-Cycle A-C Generators gives complete descriptions and specifications. Write today for your copy of Bulletin T-8100.

Compact . . . more power per pound, ratings from 5 to 200 KW

Long bearing life . . . light bearing loadings, over-size bearings

Vibration free . . . flexible couplings for isolation from engine

Heavy-duty insulation . . . long life even at ambient temperatures above 150°F.

Rugged rotor design . . . generous safety factors for torsional vibration and overspeed

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Convenience . . . large cover plates for access to exciter and generator brushholders

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HOUSTON CONTRACTING Company, Houston, has bought from Big 3 Welding Equipment Company, Houston, for its operation at Vidor, Texas, four 250 ampere welding generator sets, each driven by a DIX4D 4-cyl Hercules diesel.

SCHLUMBERGER OIL Well Surveying Corporation, Houston, has secured through Cummins Sales & Service, Inc., of Fort Worth, Texas, a 150 hp model JBIS-600 Cummins diesel, to be used as oilfield service unit. More than 50 such units are now being operated by the service company.

JOHN B. STEPHENS, Mount Pleasant, Texas, has purchased a Stewart & Stevenson diesel electric drilling rig drive unit, consisting of two GM series 71, twin-6 diesels, each driving a 200 kw dc generator, complete with controls, and dc motors for drawworks and mud pump drives, all mounted on oilfield type skid bases and with sheet metal housings.

CONSTRUCTION & MAINTENANCE Company, Houston, has bought through Stewart & Stevenson Services, Inc., two series 110, GM 6-cyl R.A. and L.A. matched diesels, each equipped with 3.75:1 hydraulic reduction and reversing gears, which will power a 65-foot twin screw crew boat.

SOUTHERN SHELL Fish Company, Biloxi, Mississippi, will install a model NHM-600 hp Cummins diesel in a fishing boat. The diesel was furnished by Cummins Sales & Service, Inc., Fort Worth, Texas.

THE BREWSTER Company, Shreveport, Louisiana, has secured from Stewart & Stevenson Services, Inc., of Houston, two series 110, GM diesels, both torque-converter equipped. The two 250 hp diesels will power an oilwell rig.

BEXAR EQUIPMENT Company, San Antonio, Texas, has added another 250 ampere diesel driven welding generator set. The unit is powered by a 40.5 hp Hercules diesel, model DIX4D. The unit was furnished by Big 3 Welding Equipment Company, Houston.

BURL PICKARD, Lufkin, Texas, will repower a truck used for highway hauling with a Cummins model JBS-600, 150 hp. diesel, secured from Cummins Sales & Service, Inc., Fort Worth, Texas.

HOUSTON OIL Field Material Company, Houston, has bought from Stewart & Stevenson Services, Inc., Houston, a General Motors diesel, series 71, twin-6, rated at 300 hp., which will be used in drilling rig service.

K. E. CRUMPTON, Galveston, Texas, has bought from Mustang Tractor & Equipment Company, Houston, a model D311 Caterpillar diesel to serve as auxiliary power on a dredge the company is operating in Galveston Bay.

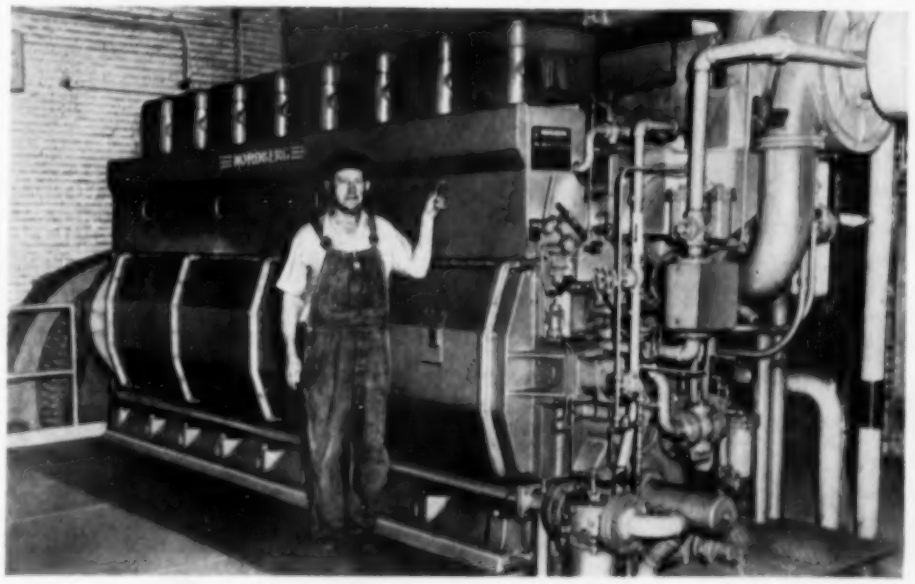
R. B. EVERETT Company, Houston, has bought through Stewart & Stevenson Services, Inc., Houston, a 2-cylinder, series 71, General Motors diesel which will used to power a crane hoist.

Flange Data Offered

A complete line of split flange type hose fittings has been announced by Aeroquip Corporation, Jackson, Michigan. Available in straight, 45 and 90 degree assemblies, the new steel fittings are designed for use with Aeroquip's single wire and double wire braid hose. The four bolt split flange features ease of positioning in installations, and rapid disassembly. The fittings conform with all S.A.E. specifications and are available in all sizes from 1/2 inch thru 2 inches.

Complete data on the new flanges may be obtained by writing to Aeroquip Corporation, 300 South East Avenue, Jackson, Michigan, and requesting Industrial Engineering Bulletin No. 5.

This engine maintains a lubricating oil economy of approximately 18,000 H.P. hrs. per gallon



Koppers Porous Chrome* Rings. Porous chrome surface holds and distributes oil during break-in. Seats quickly. Chrome prevents grit from embedding in ring surface. Prevents cylinder wall scratching. Reduces wear 50%. Lasts 4 times longer than other rings.

Here's operating efficiency as it has been proved at the Municipal Power Plant, Lindsay, Oklahoma.

A lot of the lubricating oil economy can be credited to the piston rings installed in this Nordberg Duafuel engine. They are Koppers American Hammered Piston Rings. (Porous Chrome*, Tapered O. D., and Grooved Oil Cutter Rings.)

Many manufacturers of diesel and pumping machinery insist on Koppers Rings for their equipment because they know that Koppers Rings make for satisfactory performance.

Test after test also prove that, when Koppers Rings are used for replacements, operating efficiency, and economy are markedly increased . . . often doubled. And Koppers Rings last so much longer that labor costs and costly down-time for repairs are greatly reduced.

So, to save on lubricating oil, to cut down costs, to help save on fuel, remember Koppers. Next time you have an overhaul, think of Koppers first. We are always ready to consult with you on your specific piston ring problems. And for the latest information on Koppers Rings, mail the coupon below.

Koppers Oil Cutter Rings maintain high unit pressure on the oil film. Seats rapidly. Slots in back of ring permit oil collected in channel on down stroke to flow into interior of piston. Proved efficient in thousands of installations. Extremely popular in vertical compressors and internal combustion engines.

*Van der Horst Process

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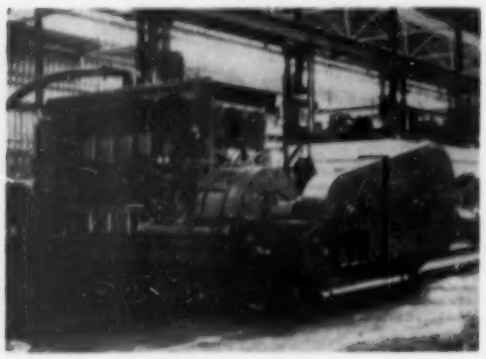
WHAT'S GOING ON IN ENGLAND

CONDUCTED BY **LEO WALTER**

Leo Walter was born in Vienna, Austria, and graduated in Mechanical and Electrical Engineering from the Vienna Technical University. He served his apprenticeship in a Czechoslovakian engineering works. Later he was project engineer during construction of power and heating plants. For six years, he was Chief Engineer for Central Europe for a well-known power plant contractor. He had established himself as an independent consultant before Nazism drove him to England in 1938. During the war years, he worked for several engineering firms, but now has his own consulting office in Cheltenham. His articles have appeared in numerous engineering magazines.

A Few English Developments

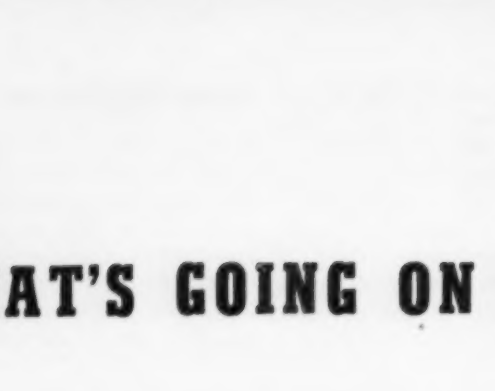
TWO outstanding new developments feature prominently among many others produced by the Diesel Department of The English Electric Company Ltd. of Rugby. The first has been shown at a demonstration at the works of The Oil Well Engineering Co. Ltd. of Stockport. It introduced a new medium-speed high-power package unit in-



corporating the English-Electric V8 diesel engine. This drives an Ideal-Oweco type C 350 slush pump, and the complete assembly will be shipped to the Lobitos oilfields.

The engine normally rated at 647 bhp when running at 850 rpm operates at 800 rpm for a continuous output of 495 bhp. Eight cylinders in V-form at an angle of 45 degrees have a bore and stroke of 10 in. and 12 in. respectively. A Vulcan-Sinclair fluid coupling is used, and transmission to the driven machinery is peformed by a Crofts Engineering gear. The skid-form frame ensures mobility, and a steel canopy covers the whole of the engine unit. During combined tests of the independently power-driven slush pump operating at 1200 psi for a fully loaded diesel power unit good results are said to have been obtained.

The Mobile dieselized generators manufactured by English Electric Co. Ltd. for the London County Council and exhibited for the first time at the Engineering, Marine and Welding Exhibition at Olympia, London, 1955, caused great interest. It solves various problems in a somewhat different but not less efficient way for such plants for Civil Defense requirements as have been built by American manufacturers. Twelve of the 400 kw self-contained road trailer units have been ordered by the British Ministry of Housing. Each is a fully self-contained generating station with air starting equipment, radiator cooling, fuel service tanks, switchgear and cables. The diesel engine is one of the English Electric "SRK" series, having 6 cylinders, each of 10 in. and 12 in. stroke. A Napier M.S. 200 type exhaust turbo-blower is used for pressure charging. Rated on a 12 hour basis an

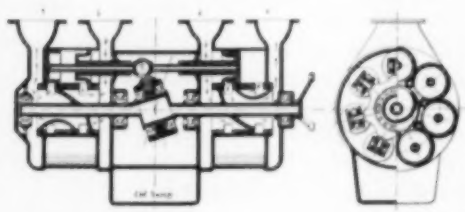


output of 675 bhp at 750 rpm is available. The 400 kw alternator generates a 415 volt, 4-phase, 50 cycle supply of electric current.

Space on the trailer on which the complete unit is mounted allows operating people to move freely. The 16-wheel trailers are a product of the J. Brockhouse & Co. Ltd. group, and axle loading and overall dimensions conform with regulations in Great Britain. Cocooning packaging methods are applied by plastic coating and by introduction of a dessicant to eliminate corrosion, and to make the units quickly available from the storage stage for action.

The first British built diesel-electric trawler was formally put into service at the end of March after trials in Aberdeen, Scotland. It is a fishery research vessel, ordered by the British Admiralty (acting on behalf of the Dept. of Scientific and Industrial Research) from Hall, Russell & Co. Ltd., Aberdeen and named *Sir William Hardy*. The complete diesel-electric propulsion equipment and trawl winch were supplied by Messrs. Metropolitan-Vickers Electrical Co. Ltd. of Manchester, but the 4 main 6-cyl. engines were manufactured by Henry Meadows Ltd. of Wolverhampton. Each have a 24-hour rating of 200 bhp at 1,400 rpm, are direct coupled through flexible couplings to 125-kw constant current generators, and each is mounted on a combined bedplate.

The Welworthy Co. Ltd. of Lymington is going to manufacture the new Ricardo-Welworthy supercharger, designed by Ricardo & Co. of Shoreham-on-Sea. The compressor has two banks of seven double-acting pistons arranged in a circle around the rotary valve which controls both inlet and outlet. A central Z-crank or wobble-plate, which does not itself rotate, drives all pistons, and the drive from the engine is to one end of the supercharger. The weight of one of the models is about 80 lbs. and the swept volume 3.6 litres. It is claimed that it has the advantage that the full swept volume is



delivered at low speeds, enabling the engine torque to be greatly improved. A single-ended (seven-cylinder) version is also available.

The well-known Sarco diversion valve, made and marketed in U.S.A. by Sarco Co., Inc., of New York, and manufactured in Great Britain by their Associates Spirax-Sarco Co. Ltd. of Cheltenham, is coming into wide use as a simple thermostatic device for controlling cooling water temperature of diesel engines. It is used in Great Britain by engine builders such as W. H. Allen & Co. Ltd. of Bedford, Mirrless, Bickerton & Day Ltd., English Electric Co. Ltd., and is also a standard fitting for many auxiliary diesel engines used by the British Navy.

Inland River Reports

By A. D. Burroughs

A RECENT visit at the St. Louis Shipbuilding and Steel Co. revealed heavy production with five towboats under construction. First observed was a new twin-screw vessel for M-W-T Co., with 2400 hp to be developed by the Cooper-Bessemer diesels. Next was a new twin-screw craft for the Cumberland River Sand & Gravel Co. equipped with Superior engines developing 1400 hp. General Motors (Cleveland) engines will power the next boat we observed—the twin-screw 1800-hp towboat for Inland Oil and Transport Co.

THE *Tom Ragsdale*, now in action, was ready for the final touches. Powered by Baldwin-Lima-Hamilton engines, rated at 1050 hp, and designed with the retractable pilothouse, this boat is the fifth built in the past year for Ohio River Co.

Another Ohio River Co. addition was ready for launching by St. Louis Ship. More powerful than her sister ships, the *Walter C. Beckjord's* Baldwin-Lima-Hamilton engines will produce a total of 3150 hp.

TWO ENTERPRISE engines will provide the 2560 hp for the new twin-screw 148-ft. towboat now scheduled for construction at Dravo for Island Creek Fuel & Transportation Co. To be named the *Raymond E. Salvati*, honoring the company's president, this one is expected to move 20 barges of coal (about 19,000 tons) in a single trip upstream against Ohio River current.

THE Sioux City and New Orleans Barge Lines, Inc. were accepting sealed bids for their planned addition of a new 1000-hp twin-screw towboat. Specifications call for two Enterprise Model DMM 363 engines with 3:1 reduction gears, and a retractable pilothouse.

A UNIQUE vessel under construction at Dravo for Steuart Transportation Co., the newly formed subsidiary of Steuart Petroleum Co., combines the basic design principles of inland river push-type towboats with the harbor type tug. The specially designed craft will be powered by two turbocharged 12-cylinder Caterpillar engines rated at 490 hp at 1225 rpm, and will carry the name *Papa Guy*.

THE triple-screw towboat *Bruce Walker*, built by Arnold V. Walker Shipyard in 1951 and equipped with GM 6-71 engines mounted two to each shaft has been acquired by the A and D Barge Lines of Ft. Wayne, Ind. Renamed the *Agnes S*, plans have been announced to boost the 990 hp to 1500 hp along with superstructure changes.

JOHN PUSHAK has purchased the old favorite, *Jane Arden* from the Brown Towing Co. Built in 1930 in Madison, Ind., this wood hull stern-wheeler carried the name *R. W. Turner*. Equipped with a 200-hp Fairbanks-Morse engine in 1936, the craft is reported in excellent condition.

ANOTHER long-active boat on inland rivers, the *Paul Chotin*, changed ownership, passing from Capts. Joe and Scott Chotin to the Towing Service, Inc. Memphis, Tenn. Originally a steam sternwheeler named *Joseph Chotin*, it was converted to diesel with twin propellers by Canulette Ship in 1946, powered with Cooper-Bessemer JS-8 engines producing a total 1800 hp.

THE OHIO EDISON CO. received the official transfer of ownership papers from Capt. W. F. Potts with the delivery of the twin-screw towboat *Billy Potts, Jr.* The 330 hp developed from the GM engines will be used for the boat's new job of switching barges at the Dilles Bottom, Ohio, power plant.

PROGRESS is being made at Calumet Shipyards on another towboat powered by a Nordberg Supairthermal engine. Material Service Corp. will take delivery in early April. The engines for this twin-screw vessel, yet unnamed, are being built at Nordberg's St. Louis plant and are of the direct drive, direct reversing type. Each has two four-cycle, six-cylinder engines rated at 800 hp.

A 105-HP Cummins Model JF-6M, for auxiliary power in a sail boat, has been purchased by A. B. Horton, Chicago, from Cummins Engine Sales, Inc., at Chicago.

THE *Winchester*, the 1800-hp craft built by Nashville Bridge Co., in 1951, equipped with GM Motors was northbound on the Illinois River for the first trip in these waters for her new owners, Ashland Oil and Refining Company.

Forms New Divisions

American Radiator & Standard Sanitary Corporation has announced its wholly-owned subsidiary, Kewanee-Ross Corporation, was dissolved and that two new American-Standard operating divisions were formed to continue Kewanee-Ross operations. Joseph A. Grazier, president of American-Standard, said that the action was taken in accordance with the corporation's policy of divisionalizing its operations along major product lines.

The two new divisions are the Kewanee Boiler Division, which will manufacture Kewanee boilers, and the Ross Heat Exchanger division, which will produce Ross heat exchangers, surface condensers and allied products.

W. B. Russell, president of Kewanee-Ross corporation, was named president of the new Kewanee Boiler division. E. M. Palmer, vice president of Kewanee-Ross, became executive vice president of Kewanee Boiler division. John C. Linsenmeyer was named president of the Ross Heat Exchanger division, with Richard S. Reade as executive vice president. Mr. Linsenmeyer is president of American Blower Corporation, also a division of American-Standard. He will continue to serve in that position as well as president of the Ross Heat Exchanger division. Mr. Reade has been director of purchases of the Plumbing and Heating Division of American-Standard.

E-M "Packaged" Generator Bulletin

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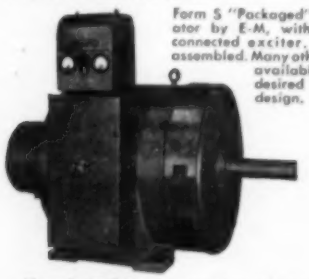
Built-in voltage regulators assure a steady output whether generators are operated singly or in parallel. When load varies, voltage output is quickly returned to desired level.



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☐ E-M Synchronizer No. 35, Generator Issue
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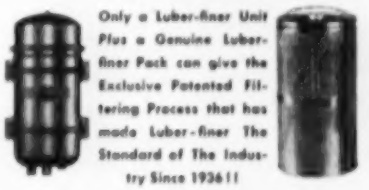

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AUTOMOTIVE DIESEL PROGRESS

A COMMENTARY BY **MERRILL C. HORINE**

Merrill C. Horine, for 38 years a member of the Society of Automotive Engineers, has been actively engaged in automotive engineering, sales promotion and training, advertising and editing of automotive publications since 1907. He has contributed numerous papers on diesel and allied subjects to the SAE and other organizations. An officer in the Air Service in World War I, he was a consultant to the Chief of Ordnance and the Automotive Division of the War Production Board in World War II.

Adapting Automotive Diesels To Marine Use

PROGRESS in diesel plants for marine use has been greatly accelerated by the adaptation of automotive types to these uses. Development of vehicular diesels has proceeded so fast and so far that today the majority of small-craft propulsive diesels and moderate-sized auxiliaries are adaptations of basic automotive designs. Such engines range in horsepower, marine rating, from 60 to more than 300, with an average, by models produced, of 157.* Engines of larger or smaller size than this are hardly to be considered automotive, since they have no application to average American motor vehicles.

Unlike the marine conversions of many gasoline automobile engines, automotive-type marine diesels are usually thoroughgoing engineered adaptations, rather than conversions. They employ the same cylinder blocks, pistons, rods, shafts and valve gear of the basic engines; but with manifolds, oil pan, accessory drives and often valve lift and valve timing altered to better suit operating requirements. As one builder of both vehicular diesels and marine adaptations thereof states: "We would be at a loss as to how a diesel engine would have to be designed differently, even if the design were intended exclusively for marine service." Generally, but not always, such marine adaptations are down-rated as compared with their vehicular counterparts, from as little as 5 per cent up to 48 per cent.* This is a tradition which some authorities feel would bear some re-examination.

Ordinarily, a stock diesel will have three ratings, namely, Maximum Performance, Intermittent Service and Continuous Service. In the marine field, there are usually two, namely for pleasure craft and for work boats, so far as propulsion engines are concerned auxiliaries usually taking the Continuous Service rating, which, of course, is the lowest. The average marine version of an automotive diesel model is down-rated from the maximum rating about 10 per cent for pleasure craft and 22 per cent for work-boat application.* Ratings for auxiliary service are usually the same as for work boats. Such practice is certainly sound so far as converted passenger-car engines are concerned, for such engines are not provided with the reserves of heat-dissipating, bearing or stress capacity required for long-sustained periods of full-power operation. This is because in the service for which they are designed, loading beyond a fraction of their capacity is possible only for very brief spurts of acceleration or grade climbing. Also a fundamental requirement in their design is minimum weight and space requirement.

Automotive diesels, on the other hand, are designed and used almost exclusively in heavy-duty truck and bus work and in industrial applications in which the work load is near maximum the greater part of their operating time. Compared with the duty on the engine imposed by a long-distance motor freight run, under-the-shovel earth-moving work or inter-city motor bus operation, for a few examples, the exactions of marine applications, whether propulsive or auxiliary, are far less demanding upon the stamina of the engine. Steady loads and complete absence of lugging characterize marine operation, driving a propeller, a generator or a pump, whereas in truck and bus work, the load is constantly varying from negative to severe, lugging overloads, with constantly recurring shock from road irregularities, the driver's response to traffic situations and gear-changes.

Of greater importance than formerly recognized are the generally lighter weight and more compact construction of automotive types. Marine architects have not been slow to recognize these virtues as they affect latitude in the placement of the engine, distribution of hull stresses, greater convenience of accommodations and increased net capacity. Economy, in terms of pounds of fuel per horsepower-hour, reaches its zenith in the high-speed automotive diesel and considering how much of the total operating cost of a boat is fuel expense, this is an especial attraction. Of course, there are a few disadvantages which the automotive diesel suffers when applied to marine service. Much of its efficiency arises from its higher crankshaft speed. This speed exceeds that at which direct drive to the propeller is efficient. The choice therefore is between reducing the maximum speed and therefore the output of the engine or adding the complication and expense of a reduction gear in addition to or a part of the reverse gear.

All automotive engines have their crankshafts suspended from the upper half of the case; whereas marine engineers prefer them laid in the bottom half. Automotive engines have their flywheels at the drive end, whereas front-mounted flywheels are an advantage in fitting the engine to the hull. Marine engines at times have need for numerous auxiliary power take-off connections not usually provided in vehicle engine designs. These include in some cases, extra sea-water cooling pump, bilge pump, hydraulic pump, bilge blower, etc., in addition to the usual generator, fresh-water cooling pump, tachometer and occasionally, air compressor. In many work boat installations, both a propulsion drive from the flywheel and a full-power take-off from the head end are required, the latter to power such things as winches for draggers, pumps for tankers, etc.

Old-time marine engines were nearly always arranged for direct sea-water cooling, their jacketing and fittings being of a character relatively immune to salt-water corrosion. Direct salt-water cooling of automotive types, however, is unthinkable and so, in adapting them for marine service, fresh-water cooling must be arranged.

In addition to cooling the jackets, the marine cooling system must also provide for water circulation around the exhaust manifold, through the jackets of the reduction gear case and sometimes through an oil cooler or lower crankcase jacket. With keel cooling, the usual circuit is from a water tank to the pump, from the pump through the engine jackets, from thence through the oil cooler or crankcase jacket, followed by the reduction gear jacket and on to the exhaust manifold jacket from where it is led to the keel cooler and so back to the tank. In the dual system, the fresh water circuit covers the engine jackets and oil cooler or crankcase jacket only, passing from the latter to the heat-

From listings in Vol. 20, DIESEL ENGINE CATALOG.

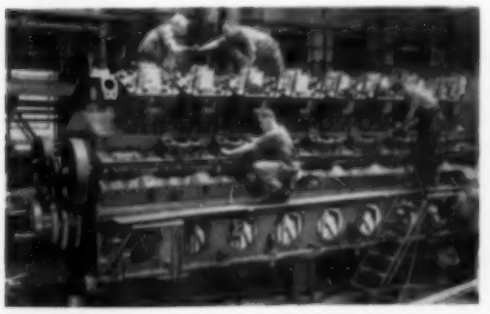
exchanger and thence back to the pump, the heat-exchanger usually being so constructed that it forms the vented equalizing tank. The salt water is drawn from the bottom of the boat by the sea-water pump, delivered first to the heat-exchanger, then through the reduction gear jacket and lastly through the exhaust manifold jacket. From here it is either led overside or, in some installations into the under-water or surface exhaust pipe.

Very few marine adaptations of automotive diesels are arranged for right- and left-hand construction, such that the accessories requiring frequent attention are on opposite sides; but opposite rotation is available in many cases for twin-screw operation. Formerly it was usual to arrange the drive from what would normally be the head end of the engine, in order to place the flywheel in front. The purpose, of course, was to better accommodate the engine to the shape of the hull at its after end, thus permitting the propeller shaft angle to be kept at a reasonable angle. This practice has all but died out, however, for with offset reduction gears or the V drive, the engine may be placed sufficiently above the normal propeller shaft height to provide ample room for the flywheel. Also the popular forms of reverse gears for all but the smallest sizes are of such diameter that they require installation at the flywheel bell-housing.

Forced crankcase ventilation, in addition to the usual bilge ventilation, is being called for with increasing frequency, being supplied either by a special engine-driven blower or by an electric blower. Other necessary additions include such things as lifting eyes for convenience in raising the engine from its cradle and where external belt drives for accessories are retained, suitable guards for safety. An engine-room instrument and control panel is usually required.

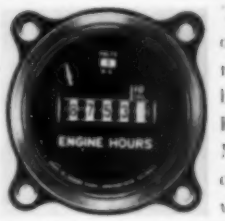
Whereas the reason for diesel use in the automotive field is almost entirely its fuel economy: the appeal to marine users includes considerations of safety in addition. Recognition of the advantages of automotive engine adaptations for marine service has been accorded by several builders of specialized marine engines. These builders now procure basic engines from automotive engine manufacturers and complete them with the special features required for marine service.

New Diesel Giant



First SW 14 Vee type turbo-supercharged 5,000 hp engine under construction at Buffalo Works, Worthington Corporation. Massive, heavy-duty gear train is shown, with 5-inch heavy camshaft, cam follower guides, oversized access doors for preventive maintenance inspection, and removable cylinder liners with cast-in water jackets.

Improved Hour Meter



The John W. Hobbs Corporation, Springfield, Illinois, has issued a revised bulletin on the improved Hobbs Engine Hour Meter. This meter is a precision timing instrument which tell at a glance the actual hours and minutes of engine operation. The timing mechanism is completely sealed in a protective clock which is wound electrically.

These hour meters are used to further protective maintenance of all kinds of equipment powered by internal combustion engines, such as air compressors, industrial engines, locomotives, ships, highway equipment, trucks and tractors. Modern engineers consider maintenance of equipment in terms of hours operated as well as miles run. The Hobbs Hour Meter provides the answer. The instrument accurately indicates the hours of operation so that lubrication, oil change, overhaul, inspection, cost of specific jobs and fuel and oil consumption can be planned and recorded.

Leading manufacturers have installed the meter as original equipment or recommended its installation. Detailed data on the Hobbs Hour Meter is available from John Hobbs Corporation, Springfield, Illinois.

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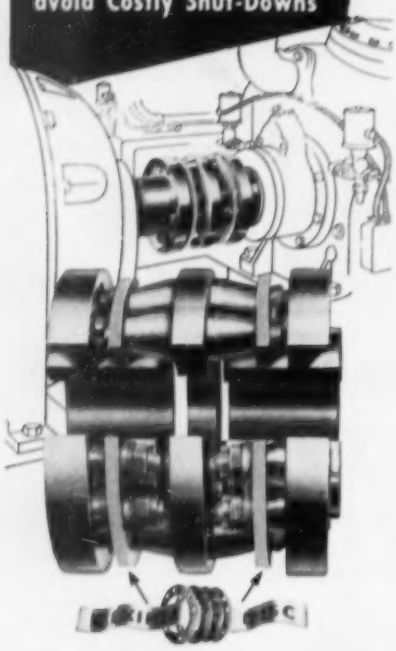

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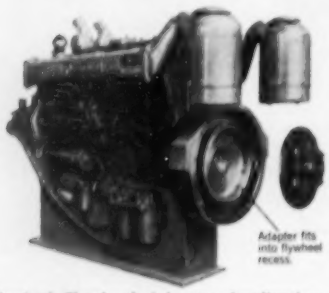

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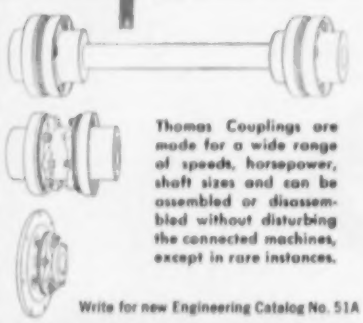
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.

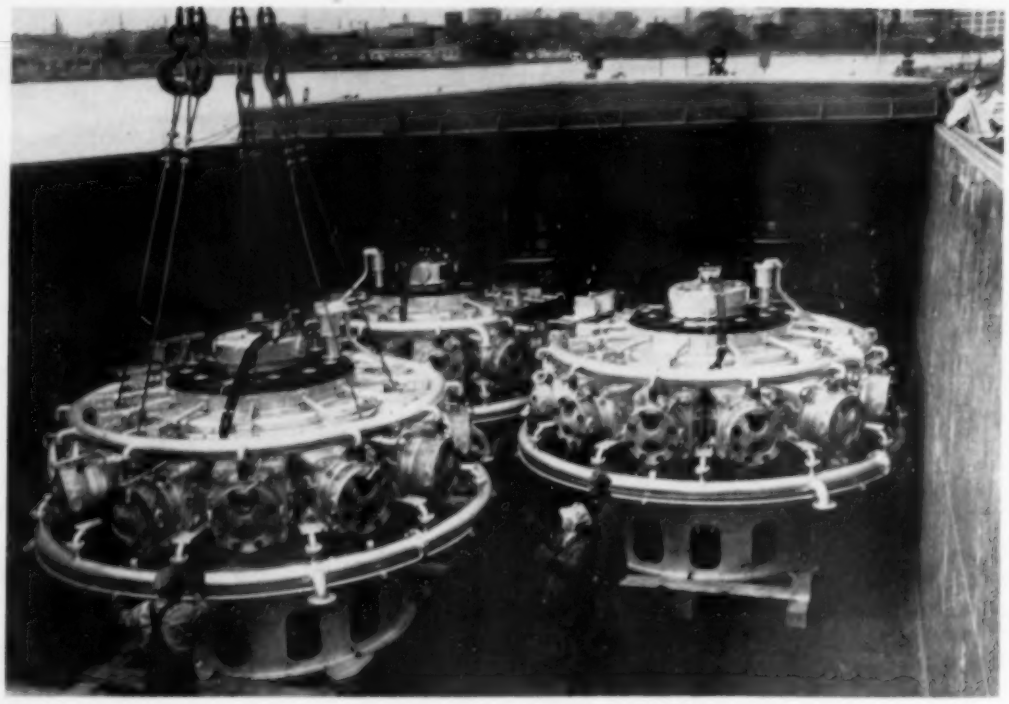


Thomas Couplings are made for a wide range of speeds, horsepower, shaft sizes and can be assembled or disassembled without disturbing the connected machines, except in rare instances.

Write for new Engineering Catalog No. 51A

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA, U.S.A.

Moves 26 Radial Engines by Barge



TO provide additional electric generating capacity for their massive smelting works at Point Comfort, Texas, the Aluminum Company of America recently purchased 26 additional 2125-hp spark-ignition, gas-burning radial engines from Nordberg Manufacturing Co. These units will give Alcoa a total of 220 Nordberg radial engines with a maximum capacity of over 400,000 horsepower at Point Comfort, now by far the world's largest internal combustion engine power station. (See DIESEL PROGRESS, June, 1952.)

Built in Nordberg's Milwaukee plant the first 11 engines of the new order were shipped by barge from the Port of Milwaukee docks to the installation site on the Gulf Coast of Texas near Port Lavaca. The John I. Hay Co., Chicago, was in charge of the shipment and moved the engines over the 2000 mile route in 17 days.

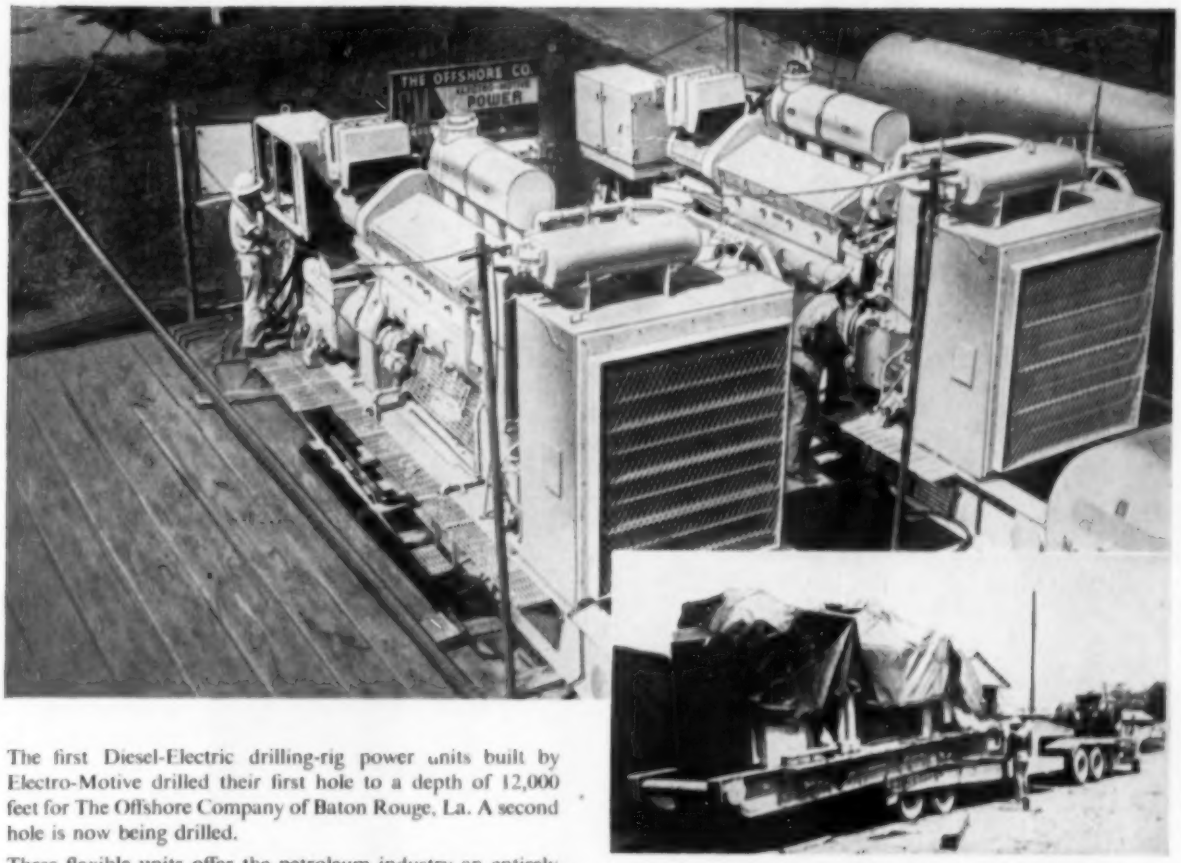
The shipment required more than the usual careful planning. Each completely assembled engine moved with police escort from the plant to the docks. Here a 70-ton capacity crane, the largest crane on the Great Lakes, placed the 32½-ton engines aboard the 195x35 ft. barge. A tug took the barge down the western shore of Lake Michigan to Chicago where it joined a regular tow for the trip via the Illinois Waterway to the Mississippi. As part of a 10-barge tow, the barge then moved to New Orleans and completed the final leg of its journey via the Gulf Intracoastal Waterway.

Top: The tenth Nordberg radial engine is eased aboard the barge which carried 11 of the engines from Milwaukee to Port Lavaca, Texas. Below: The first of the radial engines leaves the Nordberg Milwaukee plant with a police escort bound for the docks.

Fire Boat

The *Clevelander*, Cleveland, Ohio's newest fireboat. Painted red and black with white trim and with her shiny hose connections polished to a gleam the 58-foot craft attracts attention wherever she goes. The vessel is powered by GM Detroit diesels. Although popularly known as the *Clevelander* she is simply "Engine No. 21" on fire department records.

New Electro-Motive Drilling-Rig Power Plant Completes First Hole...for Offshore Company



Maximum portability of Electro-Motive Power Units is shown in this photo of skid-mounted 8-cylinder Diesel engine-generator set being delivered to Offshore Company drilling site near Houma, La.

The first Diesel-Electric drilling-rig power units built by Electro-Motive drilled their first hole to a depth of 12,000 feet for The Offshore Company of Baton Rouge, La. A second hole is now being drilled.

These flexible units offer the petroleum industry an entirely new concept in a Diesel-Electric drilling rig. A compact, lightweight package with all components engineered, built and backed by *one* manufacturer, the Electro-Motive unit features simplified control and rugged dependability at a cost far below that of previously built Diesel-Electric rigs and comparing favorably with Diesel-mechanical rigs.

Basic unit consists of eight-cylinder General Motors 567C two-cycle Diesel engine—developing 875 continuous horsepower—mounted on portable skid with two generators, generator control cabinet and engine cooling apparatus. Direct current electricity from the generators is supplied by cable to the 625-horsepower motors which, singly or in pairs, supply power for the mud pumps, draw works and rotary table.

Unmatched Flexibility

Power transmission cables are quickly and easily connected and disconnected with no bolting or taping required. Thus setup time is reduced to a minimum. Engine-generator units in land operation can be placed anywhere near the drilling site, with no need for heavy foundations or worry about alignment with mud pumps, draw works and rotary table as is required with mechanical rigs. In offshore operations, the advantage is that Electro-Motive power can be put into a minimum of space with important savings in high-cost deck area of barge.

For further information, write or call your nearest Electro-Motive representative.

Electro-Motive Division offices located in New York City, Chicago, Jacksonville, St. Louis, Tulsa and San Francisco.

ELECTRO-MOTIVE DIVISION · GENERAL MOTORS

LA GRANGE, ILLINOIS • *In Canada:* GENERAL MOTORS DIESEL, LTD., *London, Ontario*

World's Largest Builder of Heavy-Duty Diesel Engines and Electric Traction Equipment

Midwest Diesel Notes

By **L. H. Houck**

GREENSBURG, Kan., has bought a Fairbanks-Morse 10-cylinder, Model 38DD8-1/8x10 opposed-piston generating set rated at 1600 hp and 1136 kw.

DIESEL ENERGY CORP., distributors of the German aircooled Deutz diesel, has appointed two midwest distributors: James A. Mohlman, Hastings, Neb., and Crossfield & Nicholson Sales Co., St. Paul, Minn.

FABICK & CO., Jefferson City, Mo. branch, delivered a Caterpillar D4 to Veasman & Son, Dixon, Mo., for use in farming. It was equipped with a bulldozer, hydraulic control, tool bar, and two subsoilers.

C. A. BLINNE, Rolla, Mo., has taken delivery on a Caterpillar No. 12 motor grader from Fabick & Co., for use in sewer and street contracting.

LITTLE ROCK ROAD MACHINERY CO., Little Rock, Ark., was low bidder on two Hough HU4's and five Hough HF-C 1¾-yds front-end loaders for Arkansas Highway Department for $41,-197.

HIGHWAY EQUIPMENT CO., Cincinnati, reports the appointment of Andrew Winnberg, of New York, as its diesel engine specialist. Formerly with Franz Equipment Co., New York, he has had 20 years experience, Gene Tedeschi, sales manager, said.

VANDALIA, MO. special road district has accepted delivery of a Caterpillar D6 with bulldozer and hydraulic control from Fabick & Co.

PAUL VARGA & SONS, New Philadelphia, O., have repowered a 1201 Lima, 4-yd. shovel with a 300 hp Cummins NHRBIS-600-TC with Twin-Disc torque converter. Delivery was made by Cummins diesel of Northern Ohio.

CLAYTON CRAWSON, Fulton, Mo., has taken delivery of an Allis-Chalmers HD11-D with dozer and new A-C diesel, from Riney-Riney, Fulton, to be used in construction work.

I. W. WEST and Emmet Phillips, haulers for M. Bruenger & Co., wholesale produce firm, Wichita, Kansas, have bought an Autocar with a 180-hp Cummins and a White with a similar engine from Wichita White Truck Sales.

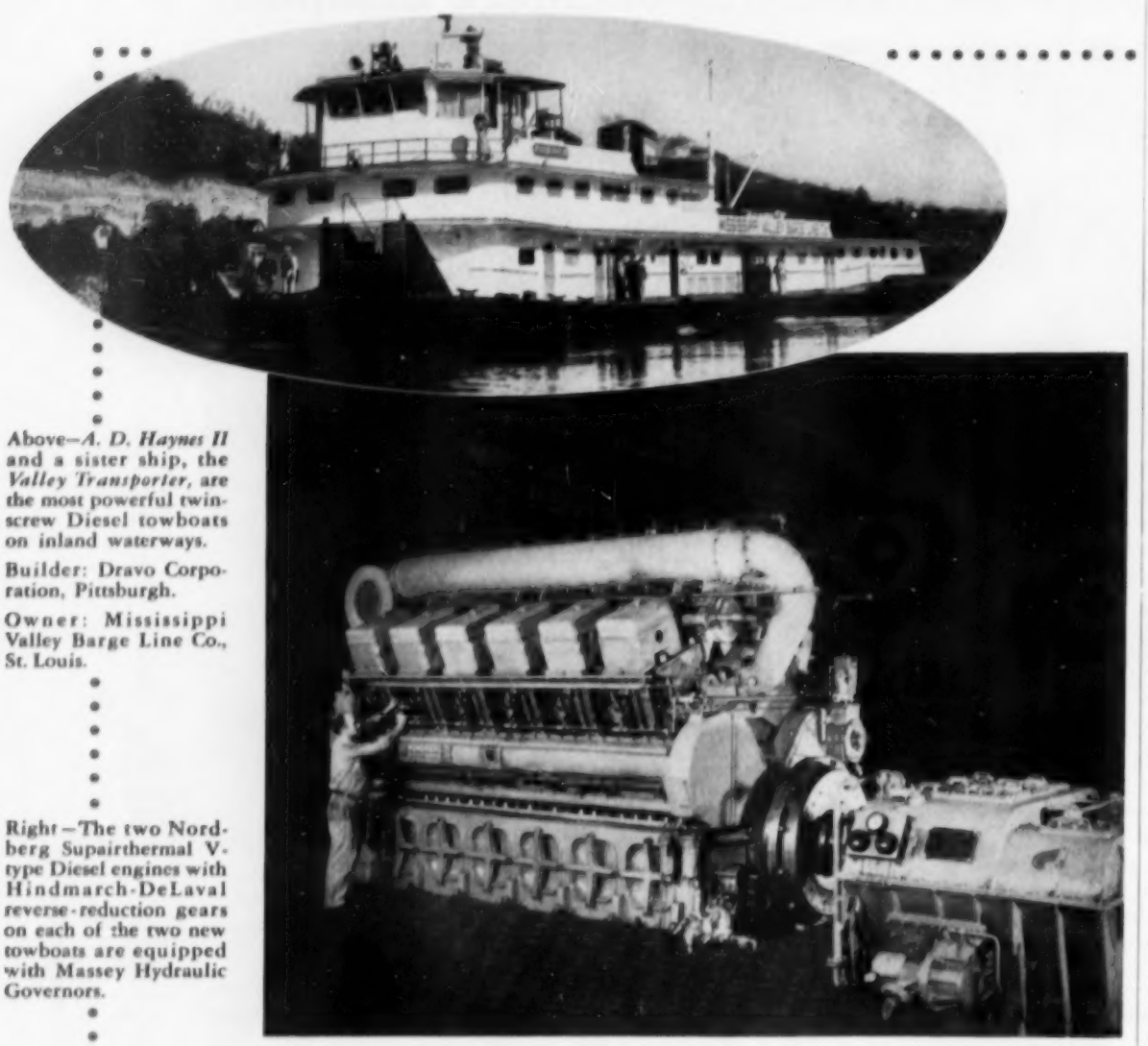
SOUTHERN GATEWAY CO., Cincinnati, is a new 18-county dealer for Oliver industrial, crawler and wheel tractors and Oliver industrial diesel units.

MISSOURI-ILLINOIS Tractor Co., St. Louis, has delivered an International TD14 with Drott lift to I. E. Milestone Const. Co., St. Louis.

FRED WEBER CONSTRUCTION CO., St. Louis, has placed in service a new Caterpillar D8 with two wagon drills mounted with hydraulic booms, supplied with air from a 600 Ingersoll-Rand air compressor with International diesel.

BUBLITZ MACHINERY CO., N. Kansas City and Wichita, Kan., has been appointed Terra-Trac dealers for Western Missouri and Kansas. Terra-Trac is powered with a Continental diesel.

FABICK & CO. supplied R. G. Aldridge, highway contractors, with three Caterpillar DW-21 scrapers and tractors with cable controls for his job at Valles Mines, Missouri.



Above—*A. D. Haynes II* and a sister ship, the *Valley Transporter*, are the most powerful twin-screw Diesel towboats on inland waterways.

Builder: Dravo Corporation, Pittsburgh.

Owner: Mississippi Valley Barge Line Co., St. Louis.

Right—The two Nordberg Supairthermal V-type Diesel engines with Hindmarch-DeLaval reverse-reduction gears on each of the two new towboats are equipped with Massey Hydraulic Governors.

Massey GOVERNORS

...regulate the propulsion engines on new 200-foot river towboats

Marquette and Massey GOVERNORS

THE MARQUETTE METAL PRODUCTS CO.
1145 GALEWOOD DRIVE • CLEVELAND 10, OHIO

MASSEY MACHINE COMPANY, INC.
785 PEARL STREET • WATERTOWN, N. Y.

SUBSIDIARIES OF CURTISS-WRIGHT CORPORATION

MOSS FEED & SUPPLY CO., Raleigh, Miss., have repowered an International truck with a 175-hp, JT-6-B Cummins diesel from Cummins Diesel Sales Corp., Memphis.

K. M. STOUT, Collinsville, Ill., has taken delivery on an International TD9 with Drott loader from Missouri-Illinois Tractor Co., St. Louis, for basement work.

WICHITA WHITE TRUCK SALES, Wichita, Kan., has delivered a White with a JBS-165 Cummins to Banks Construction Co., Eldorado, Kan.; a White with a 180-hp Cummins to Darol Traugatt, Garden City, Kan., and two Whites with similar diesels to Light Grain Co., Liberal, Kan.

DUNSTAN & YOWS, Barnett, Mo., rock quarry operators, have taken delivery from Fabick & Co. on a Pioneer 34-S portable gravel plant, powered with a Caterpillar D8800 diesel.

HANNA COAL CO., St. Clairsville, Ohio, has repowered 10 Euclid off-highway dump trucks with 400-hp, NVHBI-1200 Cummins diesels from Cummins Diesel of Northern Ohio, Inc.

Fuel System The New P & H Diesel

An entirely new and greatly simplified fuel system, designed around the Roosa-Master pump, is now standard equipment on all P & H Marine diesel engines which are offered in sizes from 30 to 255 horsepower. Visitors to the New York Boat Show in January will have an opportunity to inspect this new P & H fuel system. Also to be featured at the Show are new, flexible mounts for P & H marine diesels, especially designed to minimize vibration and facilitate ease of installation.

The good response over the entire speed range of P & H marine diesels combined with their horsepower, high operating speeds and light weight tends to make these engines very appealing to pleasure craft owners as well as commercial vessels. For easier starting the P & H fuel system automatically retards injection until engine speeds reach 500 rpm. Injection is then gradually advanced, matching the increased operating speeds. The manufacturer, The Harnischfeger Corporation, states that this results in extremely fine idling characteristics, faster acceleration and deceleration, quicker engine response and overall smoother operation. As explained by the manufacturer, the new system is easier to understand and easier to service. It does away with a total of 131 separate parts and is 49.5 lbs. lighter in weight than the former fuel system – an important considerations in marine applications.

Exceptionally light in weight and compact in size as related to horsepower, P & H marine diesels are of 2-cycle design. They deliver power every down stroke of the piston; there is no coasting stroke. A highly serviceable feature of the P & H Engine is its "Unitized" power assembly. With this feature, it is possible to replace an entire cylinder assembly (or each component)—consisting of head, liner, pistons and rod, as a single easy-to-handle unit. This is achieved in a matter of only 40 minutes, the builder states.

A choice is offered of hydraulic or manual reverse gears as well as various reduction drives and optional front-end power take-off equipment. Electric generating sets up to 100 kw are also in the P & H line. Complete illustrated literature on both P & H diesels and P & H generating sets is now available by writing the manufacturer: P & H Diesel Engine Division, Harnischfeger Corporation, Crystal Lake, Illinois.

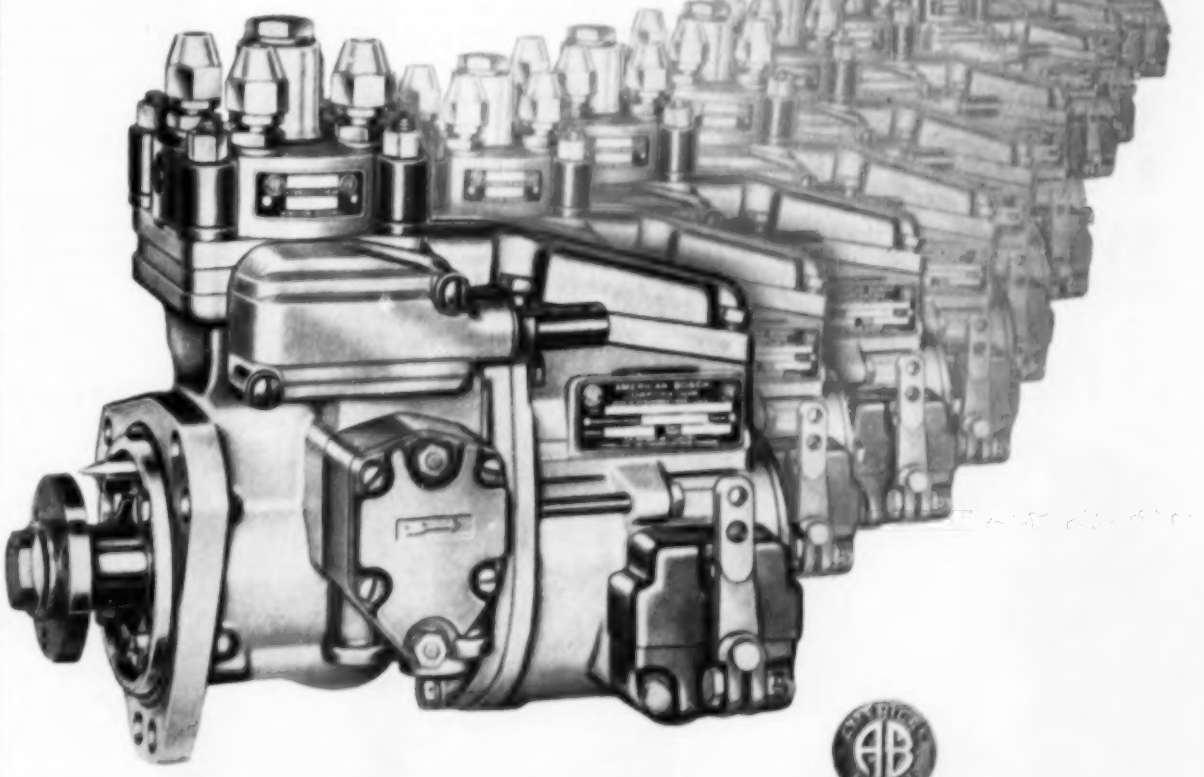
over 100,000...and STILL GROWING

Now over 100,000 American Bosch PSB injection pumps have been produced for the Diesel Industry.

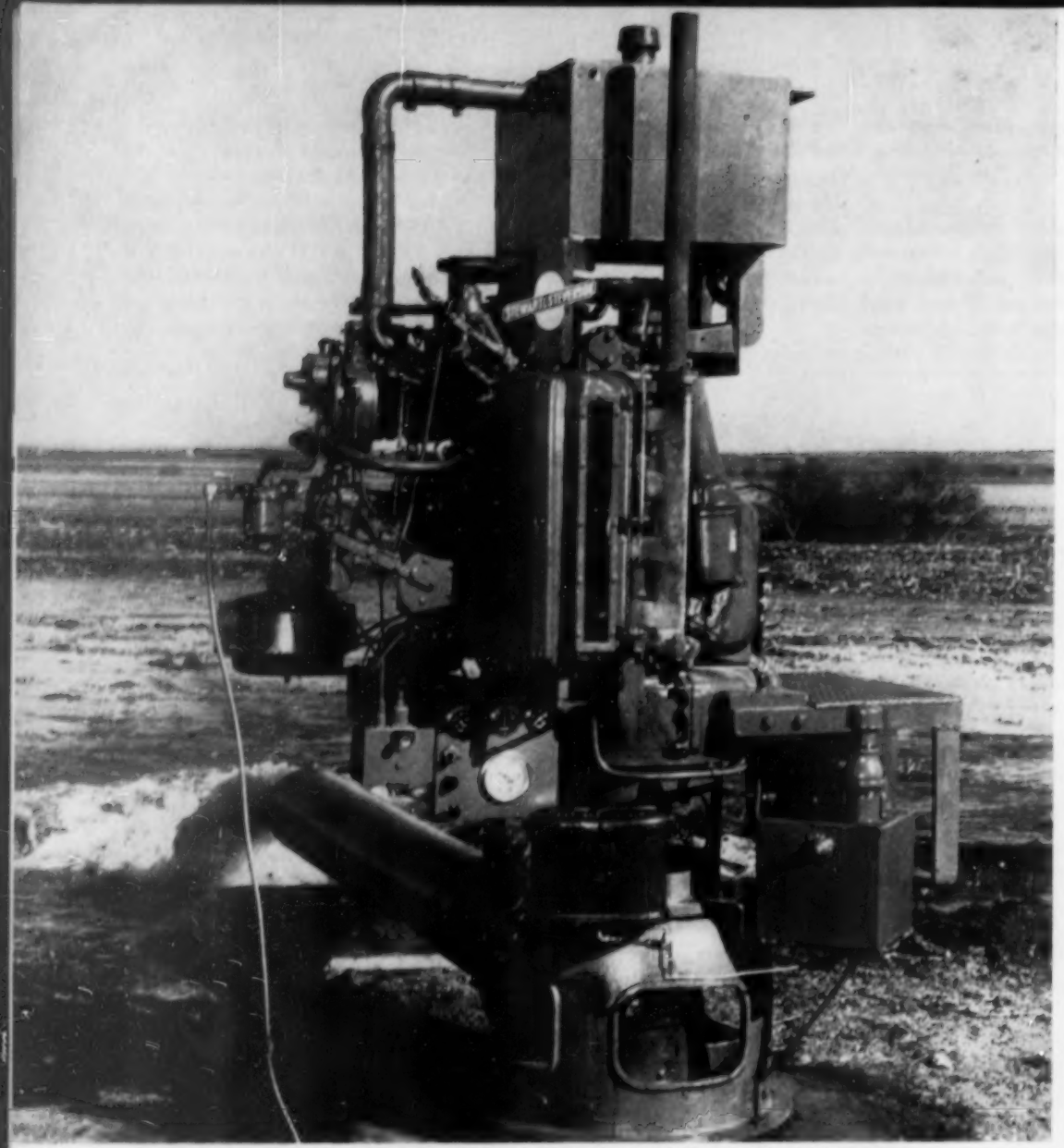
This record, established in the space of just a few years, proves conclusively the wide acceptance of this simplified, distributor type pump.

Today, more Diesel engine manufacturers than ever before are using the American Bosch PSB as standard equipment on the smaller Diesels that power farm tractors, compressors, generating sets, boats and trucks in ever-increasing numbers.

The American Bosch PSB has an outstanding record of performance and dependability—assuring users everywhere of long trouble-free service and low maintenance expense. It stands as a significent contribution to the progress of the Diesel engine. American Bosch, Springfield 7, Massachusetts.



AMERICAN BOSCH



Stewart & Stevenson Services modify lube systems of GM Detroit Diesel 6-71 engines, design suitable thrust bearing adapters, and stand engines on their heads to do irrigation pumping on New Mexico land.

VERTICAL ENGINES SOLVE UTE MT. FARMS PROBLEM

WHEN they gambled on getting enough subsurface water to supply their Ute Mountain Farms in Taos County, New Mexico, the newly developed vertical application of General Motors Diesel engines and Red Head turbine pumps from Stewart & Stevenson Services in Houston, Texas turned out to be the winning combination for Jim Abbott and H. G. Traxler. The Ute Mountain Farms are located 14 miles north of Questo, New Mexico, in an area with an average annual rainfall of only about 10 inches. Total acreage is 3846 at an elevation of 7500 ft. The flat plain of sandy loam is covered with only sage and rabbit brush and is so arid that it is impossible to graze sheep or cattle there most of the year.

When Abbott and Traxler bought the land, they took a chance on getting subsurface water by means of deep well turbine pumps and invested a large amount of their capital in pumping equipment. They drilled their first water well and found good water in a coarse sand and gravel which ran to a depth of 500 ft. Since, six wells have been drilled which test over 2000 gpm. All are equipped with Red Head turbine pumps powered by the revolutionary new vertical application of the General Motors Model 6-71 diesel engine pioneered and developed by Stewart & Stevenson. This direct connection of the fly wheel end of the diesel to the turbine pump—in which the engine virtually stands on its head—was accomplished by Stewart & Stevenson after extensive research and development testing to provide proper compensation for the change in thrust on the engine crankshaft, as well as changes to the engine lubrication system to permit operation of the crankshaft in a vertical position.

Changes necessary were relatively simple and followed conventional and sound engineering practices. Among the more important changes to the series 6-71 GM engine was the modification of the lubrication system and the design of an adequate thrust bearing adaptor between the engine fly wheel and the turbine pump.

From a performance standpoint, after more than two years of practically constant operation on hundreds of consumer installations, the vertical crankshaft mounted unit has proved to be equal or superior to conventional units in engine life and endurance. Also, according to Stewart & Stevenson, the fuel economy has been better in proportion to gallons of water pumped due to elimination of efficiency losses inherent in any gear drive. The vertical engine application offers other advantages over conventional right-angle gear driven engines. The complete engine and pump are combined into a single unit, eliminating the right-angle gear drive, the special universal joint and drive shaft coupling, the engine clutch and power take-off, and the separate engine foundation and sub-base. Elimination of the efficiency loss reduces operating costs, and the initial cost of the unit is approximately 10 to 20% under the cost of conventional installations, say Stewart & Stevenson.

Irrigation at Ute Mountain Farms is by flood method from earthen ditches. The owners estimate that each well will irrigate 160 to 200 acres. A variety of crops constituted the first planting, but most acreage was devoted to Red McClure and Russet potatoes, barley, and sugar beets, grown under contract. Other crops include spinach, carrots, lettuce, cabbage, pinto beans, Alaskan peas and corn. The growing season is approximately six months, with temperature extremes from 30°F below zero in the winter to 95°F in summer.

Below is different view of another of the vertical engine installations. On Ute Mountain Farms, six such units test out at 2000 gpm.

Left to right: Red Blackburn, Ute Mountain Farms manager; Pete Ortiz, maintenance foreman; and Clairborne Jones, representative of Abbott and Traxler, the owners.

Florida Diesel News

By Ed Dennis

Miss Powerama, the Florida-built shrimp trawler featured at the General Motors Powerama in Chicago, has been sold to Casey & Brown of Tampa. Powered with a GM 6-110 diesel and an Onan diesel generating unit, it was built by Diesel Engine Sales of St. Augustine.

One-piece, aircraft-type ring clamp holds top securely. No nuts or bolts to lose or bother with.

Amazing . . . New

W.G.B. 750 CUBIC INCH OIL FILTER

uses FULL SIZE (8 x 15) cartridge that can be changed in 3 minutes WITHOUT TOOLS

- **YOU GET** a *full size* 750 cubic inch oil filter when you use W. G. B.--because it's made big enough to use a *full size* (8 x 15) S-11C cartridge. That's why W. G. B. thoroughly cleans more oil faster--and keeps its color clear longer.
- **NO NUTS AND BOLTS**--the new W. G. B. Model WD-2-750 cubic inch Clar-O-fier uses a top that's held securely by a clamp, equipped with a *single hand tightening device.*
- **NO LEAKAGE**--an "O" ring gasket keeps the oil completely locked-in under any operating pressure.
- **QUICKLY INSTALLED**--in most instances fits into the brackets used for any 750 cubic inch filter.
- **FOR BEST RESULTS**--use only the genuine W. G. B. Clar-O-fex Replacement Cartridge (No. S-11C).

APPROVED BY LEADING ENGINE MAKERS

- **REMEMBER W. G. B.** has not--and will not--reduce the size of its S-11C (8 x 15) cartridge. Specify the W. G. B. S-11BC cartridge for *smaller size*, so-called 750 cubic inch oil filters.
- **W. G. B. MAKES REPLACEMENT CARTRIDGES FOR ALL POPULAR MAKES OF FILTERS.**
- **SPECIFY W. G. B. AS ORIGINAL EQUIPMENT — OR ORDER FOR REPLACEMENT.**

WRITE FOR COMPLETE DETAILS AND NAME OF NEAREST DISTRIBUTOR

W.G.B OIL CLARIFIER INC. KINGSTON, NEW YORK

RECENT CUMMINS installations include a JT-600 in an International tractor for John Goddard of Lakeland. At Ft. Myers, Colman Coker received an Autocar with a NHB-600 Cummins diesel.

THE YACHT *St. Pete*, a 63-footer, was repowered from gasoline engines to two General Motors 6-110 diesels, each rated 300 hp, by Ellis Diesel Sales & Service of Fort Lauderdale for Betty Carstairs of the Bahama Islands.

SHELLEY Tractor & Equipment Co., Miami, reports four D9 Caterpillar tractors have been sold, powered with 286-hp diesels and Twin Disc 3-stage torque converters. The first and third went to Troup Bros. and the second and fourth went to Barney Walden.

AT APPALACHICOLA, the Franklin Fish & Oyster Co. received a 4-cylinder Cummins diesel for one of their shrimp boats. Rated 120 hp, this diesel was sold by Cummins Diesel Sales, Inc. of Birmingham, Ala.

FOR A portable saw mill at Dade City, a Model 3031C GM diesel, rated 80 hp at 1700 rpm, and a GM 2055, 43 hp, to run a portable wood planner, were sold to John D. Ward by General Engine & Equipment Co., Tampa.

NEW SMYRNA BEACH power plant plans to add two new Enterprise diesel generating units, one about 1700 kw the other 2200 kw.

A HERCULES, rated 38 hp at 1600 rpm with Borg-Warner 2:1 gears, for use in a self-propelled lifeboat on the *S. S. Evangeline,* was sold by Auto Marine Engineers of Miami.

FROM Florida Diesel Engine Sales, Miami; one General Motors 6-71 diesel and one GM 3-71 to replace two steam engines on an oil barge for Belcher Oil Company.

AT TAMPA, J. C. Leonardi and Son Towing Co., took delivery of a Model 38F5¼ 8-cylinder Fairbanks-Morse diesel, rated 600 hp, for use in a tow boat.

CUMMINS dieselized construction equipment recently received includes two Model T55 International road scrapers by Fred Chastain, Miami; a similar unit by Gaines Construction Co., plus two more for Blyth Bros., W. T. Price Dredging Co. of Miami. Engines are 165-hp.

ELLIS Diesel Sales & Service, Ft. Lauderdale, sold a 3-kw Onan diesel generating unit for the yacht *George W* of Toronto, Canada. It replaces a small gasoline engine.

THE 48-FOOT *Fleetwood II* was repowered with two GM 6-71 inclined diesels and an Allison Torqmatic marine gear by Florida Diesel Engine Sales, Miami.

A WAUKESHA, rated 585 hp, was sold for the newly repowered 97-ft. *Combat*, a combination shrimp trawler and factory ship. She does 13 knots at 1000 rpm. Other engines included were two 10-hp and two 20-hp Petter diesels for the freezing system, plus three Oliver 177 diesels for the Onan light plants. Owner is the Southern Seafood Transport Inc., of Jacksonville.

AUTO MARINE Engineers, Miami, have been appointed distributors for Florida and the Caribbean area for the A. E. Inertia starter for diesel engines, manufactured by Bendix International.

A GENERAL MOTORS Model 4-51 diesel with a Paragon gear was sold for the 33-ft. party fishing boat *Hazel C* of Dunedin owned by Cecil Suthrie. Sale was by General Engine & Equipment.

Purchases Filter Companies

Robert L. Fielding, president, announced recently that Commercial Filters Corporation of Melrose, Massachusetts, in accordance with the company's policy to expand its filter lines, has acquired the filter division of two Indiana companies: Houdaille-Hershey of Indiana, Inc., Lebanon and Michiana Products Corporation, Michigan City. It is contemplated that the operations of the latter company will be consolidated with those of Lebanon. By the addition of the Honan-Crane (Houdaille-Hershey) and the Michiana filters to their own well-known FulFlo filters and Honeycomb filter tubes, Mr. Fielding states that the company will produce a complete line of filtration equipment for the chemical, petroleum, diesel and industrial fields. Commercial Filters Corporation is a wholly-owned subsidiary of the Ogden Corporation of New York.

Euclid Dealer

J. W. Bloomquist, sales manager of Euclid Division, General Motors Corporation, has announced the appointment of Ray C. Call Company of South Charleston, West Virginia as authorized dealer for the complete line of Euclid earth moving equipment. The territory covers all of West Virginia except the counties of Brooke, Hancock, Marshall, Ohio, Morgan, Berkeley and Jefferson—and includes Garrett and Allegany counties in Maryland.

In addition to Euclid, the company represents Detroit Diesel, Le Roi, and other well known construction equipment lines. Located on U.S. Route 60, Ray C. Call Company maintains complete parts and service facilities and an experienced staff of equipment personnel. Ray C. Call is president and Everett C. Call is general manager. J. H. Bentley and J. R. Moody head the service and parts department respectively.

JUST RELEASED!

New 48-page GM Detroit Diesel Service Tool Manual. Contains complete information on all Kent-Moore Special Tools needed to perform factory-recommended service on GM Series 51, 71, and 110 engines used by:

- **GMC Truck and Coach Division**
- **Euclid Division**
- **Allis-Chalmers**
- **LeTourneau-Westinghouse**
- **Other End-Product Manufacturers**

For the GM Detroit Diesel user, this new manual describes and illustrates special service tools designed to enable servicemen to duplicate factory-assembled conditions and specifications.

KENT-MOORE ORGANIZATION, INC.

ENGINEERS AND MANUFACTURERS OF SPECIAL SERVICE TOOLS AND EQUIPMENT

***FREE* - SEND COUPON NOW**

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Send me FREE copy of new Kent-Moore GM Detroit Diesel Service Tool Guide.

Name_____
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"Flying Cloud" From Florida

Diesel Engine Sales Co., of St. Augustine, packaged another trawler for the Florida shrimping industry when the recently launched *Flying Cloud* made its first trip down the East coast of Florida to its home port at Key West.

Tams designed and built with top workmanship, this 67 x 18 vessel which is powered with a General Motors 6-110 diesel engine and an Allison 3:1 rkr gears driving a 50 x 44 five blade Columbian bronze propeller. Speed on the trial run was 11.5 knots. The *Flying Cloud* was built for Mr. A. Maitland of Thompson Enterprises Key West Florida.

The *Flying Cloud* leaves for Key West, Florida, powered with a General Motors 6-110 diesel engine, it made 11 knots down the east coast to its home port.

Ocean-Going Dieselized Cargo Ship

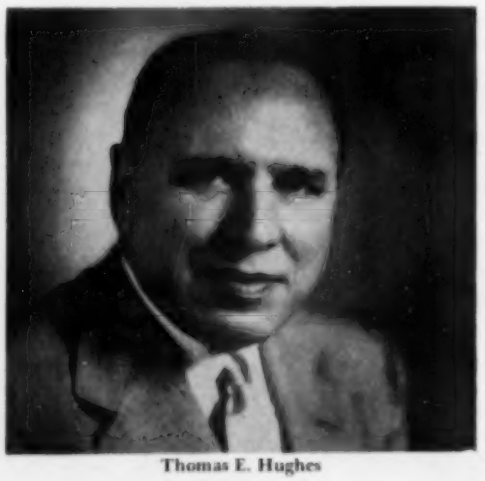
Burmeister & Wain's shipyard at Copenhagen recently delivered the cargo motor ship *Simba* to the East-Asiatic Company Limited of Copenhagen. The vessel has been built to Lloyd's Register of Shipping's highest class + 100 A.1. (with dimensions corresponding to a mean draught of 8.306 mtrs. + R.M.C.

The ship is a single-screw motor ship with two through-going decks, raked stem, and cruiser stern. The engine room is amidships, with three holds forward and two holds aft. The main engine is a 7-cylinder, B&W single acting, two-stroke cross-head diesel engine type 774-VTBF-160 with turbo-charge and is suitable for both diesel oil and boiler oil. Normally the engine develops 9800 ihp at 115 rpm and this is B&W's latest type. The auxiliary engines comprise three 4-cylinder, four-stroke, single-acting diesel engines type 425-MTH-40, each developing 180 bhk at 400 rpm corresponding to 120 kw at 220 volts. These engines, too, can burn diesel as well as boiler oil.

DEMA Elects Officers

At the annual meeting of the Diesel Engine Manufacturers Association held in New York City recently, the following officers were elected to serve for the fiscal year, 1956: President, Thomas E. Hughes, general manager, Cleveland Diesel Engine Division, General Motors Corporation, Cleveland, Ohio; Wm. E. Butts, president, General Metals Corporation, San Francisco; Walter A. Rentschler, vice president, Baldwin-Lima-Hamilton Corporation of Philadelphia; Robert H. Morse, Jr., president, Fairbanks, Morse & Co., Chicago; and as executive director and secretary, Harvey T. Hill of Chicago.

The following men together with the foregoing officers, will serve as directors of the association: Wm. F. Burrows, general manager, White Diesel Engine Division of the White Motor Company, Springfield, Ohio; Guy J. Coffey, president, Chicago Pneumatic Tool Company, New York; John N. MacKendrick, president, Clark Bros. Co., of Olean, New York; Lawrence F. Williams, president, The Cooper-Bessemer Corporation, Mt. Vernon, Ohio; M. C. Davison, vice president, Ingersoll-Rand Company, New York; Robert E. Friend, president, Nordberg Manufacturing Company, Milwaukee; Otto H. Fischer, president, The Union Diesel Engine Co., Oakland, California; E. J. Schwanhausser, president, Worthington Corporation, Harrison, New Jersey and Gordon Lefebvre, Dresser Industries, Orlean, New York. The honorary Chairman will be George W. Codrington, Cleveland, Ohio, and the honorary vice chairman will be A. W. McKinney, president, National Supply Co.



Thomas E. Hughes

European Diesel News

By Leo Walter

A fleet of special diesel-driven vessels for ice-filled waters in the Artic and Antarctic has come into operation or is on order by J. Lauritzen Lines of Copenhagen, Denmark. The company claims to have over 30 years of experience of navigation in northern waters and knows the demands on efficient ice-breaking and strengthened vessels. All the Arctic ships use diesel, and among these notable vessels are the M/S *Kista Dan* and M/S *Magga Dan*. In addition to several other highly ice-strengthened vessels on order, recently two 2,400 tons vessels were ordered, they will come into operation in July and September, 1956. Also recently ordered, a sistership to the M/S *Magga Dan* called the *Thala Dan*.

Of interest to American readers are discussions taking place to extend the activities of these powerful special ships for navigating the ice-strewn waters of Ungava Bay in the far North-East of Canada in order to exploit deposits of iron ore. Up to now these regions have been icebound for over 6 months, but construction of a new harbor in Greenland is under consideration, which harbor is icefree and could take ore shipments all the year round.

At the present time seven special Arctic ships, all diesel, are either under construction or on order by the Lauritzen company, and all will be completed in 1956-57. Among them are two ships each of 4,000 tons being built in Hamburg, while two other Arctic Ships are under construction at Aalborg in Jutland, have a specially strengthened bottom and stern. Among the Lauritzen fleet the M/S *Kista Dan* became celebrated durings its Greenland and Antarctic service as the last word in Arctic sailing and ice-strengthening.

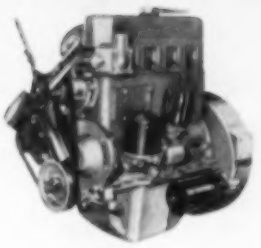
This motor vessel was built in 1952 and is considered to have several special features, being a combined passenger and cargo ship able to break icebound waters. The main-engine is a direct-reversible, single-acting, two-stroke, 6-cylinder diesel of Burmeister & Wain type. Cylinder diameter is 350 mm, stroke 620 mfm, giving the vessel about 12 knots fully loaded. Its normal output of 1,200 ihp at 245 vpm is rather powerful for this size of vessel. Fuel oil bunker capacity is also great, namely 250 tons giving about 14,500 miles range of action.

A special vessel of this kind needs reinforcements, and right from fore to aft the shell plating is increased 75-100% in thickness, and in the fore-part even more. Frame-spacing is only 12 in., which is double the standard for normal ships. Thus the local strength of the shell in the forepart is 16 times greater than the strength of a normally designed ship. The Navigation Equipment includes 2 modern American type of radars (Raytheon Marine Pathfinder and R.C.A.), gyro compass, and two British made Hughes echo-sounders (Kelvin & Hughes Ltd), one for shallow and one for deep water. A British Decca Navigator is also installed, a complete wireless station, telegraph and telephone direction finder, electric log, and a loud-speaker system.

HERCULES *announces*

new INTERCHANGEABLE models

G.O. SERIES GASOLINE OVERHEAD VALVE



G.O. 4 CYL.

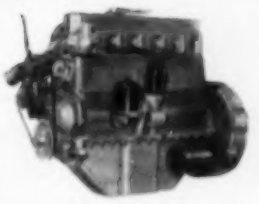
G.O. 4 CYL.

Model	Max. H.P.
G.O. 173	67 @ 3200 R.P.M.
G.O. 198	76 @ 3200 R.P.M.
G.O. 226	87 @ 3200 R.P.M.

G.O. 6 CYL.

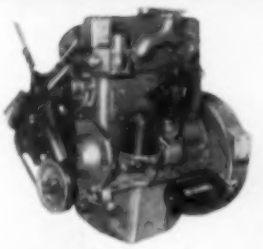
Model	Max. H.P.
G.O. 260	102 @ 3200 R.P.M.
G.O. 298	114 @ 3200 R.P.M.
G.O. 339	131 @ 3200 R.P.M.

Also available for L. P. G., Kerosene and Natural Gas



G.O. 6 CYL.

D.D. SERIES DIRECT INJECTION DIESEL



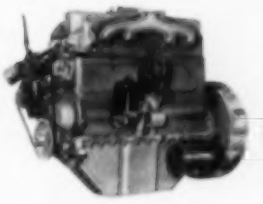
D.D. 4 CYL.

D.D. 4 CYL.

Model	Max. H.P.
D.D. 173	50 @ 2000 R.P.M.
D.D. 198	57 @ 2000 R.P.M.
D.D. 226	65 @ 2000 R.P.M.

D.D. 6 CYL.

Model	Max. H.P.
D.D. 260	75 @ 2000 R.P.M.
D.D. 298	85 @ 2000 R.P.M.
D.D. 339	98 @ 2000 R.P.M.



D.D. 6 CYL.

Additions – to the extensive line of ***Hercules Engines***

With the addition of these four new series consisting of 12 models, the Hercules Motors Corporation has increased its line of engine sizes and types to better serve the varied needs of the many industries which require gasoline and diesel engines for their power requirements. This expansion of the Hercules line will enable manufacturers of end products to have a wider selection of engines and power units to meet individual requirements, all available from one dependable source.

Mounting dimensions of the new G.O. gasoline and D.D. diesel four cylinder engines are the same. The G.O. gasoline and D.D. diesel six cylinder engines are also interchangeable from the standpoint of mounting dimensions. Since this new series consists of parallel lines of gasoline and diesel engines, they can be used interchangeably, if desired, in any end product within the recommended engine speed ranges. Further, these engines can be built with manifolds and accessory equipment on either side, as the cylinder blocks are symmetrical and can be turned end for end.

Another important feature of these new models is the great number of parts which are interchangeable between the fours and sixes, and also, between the gasoline and diesel. This greatly simplifies the parts and service requirements. The only essential differences between these gasoline and diesel engines are cylinder heads, manifolds, pistons and fuel handling equipment.

Further information on the G.O. and D.D. series may be obtained by writing the factory.

HERCULES MOTORS CORPORATION

CANTON, OHIO

The "Etta K III"

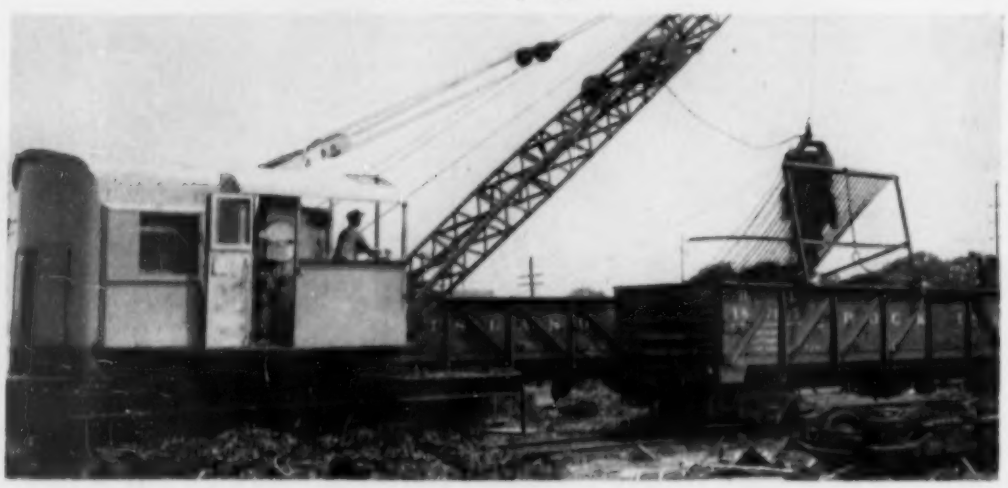
The *Etta K III*, a new 42-ft. Chris-Craft recently delivered to Sam D. Ruby of Chicago, gets a try-out on waters near Algonac, Michigan. Later the craft, under command of Captain Ken Adams, left for Florida via the Erie Canal and the Atlantic Inland Waterway. The craft is powered by two GM inclined diesels developing 151 shaft horsepower each. The diesels turn 22 in. by 18 in. screws through 1½ to 1 reduction gears. The craft is Chris-Craft's standard Commander model with a flying bridge and sport fishing gear as additional features. She will be berthed at Miami Beach for the winter. The General Motors inclined diesels aboard the *Etta K III* give the craft a cruising speed of 16 knots.

Electro-Magnet Crane Conversion

Conversion of a steam locomotive electromagnet crane to diesel power, features a variable speed direct current generator which eliminates the small gasoline engine driven generator. The installation accomplished by The Midland Iron and Steel Co. of Moline, Ill., is gaining increasing interest because only the diesel engine is required. The unit has sufficient power to double as a switcher. Considerable operational savings have resulted from the uncomplicated arrangement for providing steady electrical power under any speed.

There are many scrap yards and steel yards which could readily use this method. In the past, any workable arrangement for electromagnet cranes required a separate generator to produce a constant source of dc current. One engine was impracticable with former generators because as engine speed varied so did the voltage and output which resulted in the load also dropping. In magnet crane operation it is imperative that constant voltage and full output are maintained at all times regardless of load.

A Caterpillar D318 diesel engine provides power for traveling and also powers a direct current variable speed generator.



Martin-Roasa Tractor and Equipment Co., Caterpillar Dealer in Cedar Rapids, Iowa, approached The Midland Iron and Steel Co. of Moline, Illinois, with the new conversion idea. This company was so interested that it purchased, as scrap, an old 25-ton Industrial Brownhoist locomotive steam crane, equipped with a 45 in. electromagnet, for converting. A Caterpillar D318 diesel engine with a Twin Disc torque converter was installed. This engine powers both the crane machinery and the variable speed generator. The engine delivers 100 horsepower at 1600 rpm. The generator is belt driven from a front power takeoff with a 1:1 ratio. The generator is double-ended and has a through shaft. A pulley is rear mounted on this through shaft which belt drives a 40 cubic foot Westinghouse air compressor to supply air for the crane air actuated controls and brakes.

New Model Announced

Luber-finer, Inc., Los Angeles, has announced the addition of the new Luber-finer Model 363-C, designed for mobile, stationary and marine engines with up to 4-gallon crankcase capacity. This Luber-finer Model 363-C, along with the Luber-finer Models 272-C, 500-C, and 750-C, previously announced to the trade, completes a line of new Luber-finer industrial models for diesel, gasoline, and natural gas engines with crankcase capacities of from 3 gallons to 8 gallons. The 363-C, with Luber-finer's single bolt closure, offers the same simplified pack replacement that met with immediate acceptance when offered to the trade in the new Luber-finer models 272-C, 500-C and 750-C. Also, the new Luber-finer model incorporates the positive sealing "O" ring type gasket that assures leak-proof lid closure at all operating pressures, and the same one-piece extruded steel housing and rugged mounting bracket design. An outstanding feature of the new 363-C model is the screw-in type Luber-finer pack that assures a positive pack seal and eliminates the possibility of oil ever by-passing the Luber-finer pack. For further details, write Luber-finer, Inc., 2514 South Grand Avenue, Los Angeles 7, California.

ITS NEW

Mechanical Progress Exhibit

Allis-Chalmers Manufacturing Co., General Motors, International Harvester, Pur-O-Lator Co., and Woodward Governor Co., were among 16 leading manufacturers who had educational exhibits in the main lobby of the Department of Commerce Building in Washington D.C., recently. The theme of the exposition was "Research and Progress in the Mechanical Field Under the American Patent System." The Woodward Governor display traced the history of its patents from the original one, issued May 31, 1870 to Amos W. Woodward. The original working model was on display.

Aids Cold Weather Starting

With cold weather now with us, and with the mounting construction costs of heated garage buildings for truck fleets, owners and operators of diesel-driven units may find Kim Hotstart electric pre-heater one of the answers to their winter maintenance problems. The Kim device plugs into any electric outlet and through a percolator-like action keeps the engine ready for instant starting even when the vehicles are stored outside in sub-zero weather. In literature available from the manufacturer, typical installations are shown and specifications listed for various sizes and types of engines. Write the Kim Hotstart Mfg. Co., West 917 Broadway, Spokane 1, Wash.

Light Weight Air Filter

An entirely new, light weight, fully automatic and self-adjusting air filter designed for industrial use has just been announced by the Emco Pneumatic Corporation, 1317-1319 Locust Street, Des Moines, Iowa. It is called the "Emco Jet" air filter. The company has been manufacturing an air filter which weighs 1¾ pounds and requires adjustment when used for various air tools. The new, compact, completely automatic unit weighs only 12 ounces. The major parts are made of light weight aluminum instead of brass and requires no manual adjustment. Although the exterior appearance of the two units are similar, the internal mechanism in the new, fully automatic, light weight unit has been radically improved.

Flowmeters of Direct Flow Design

Two new indicating flowmeters that feature flow through the meter chamber have been announced by the Instruments Division of Scully-Jones and Company, Chicago, Ill. Direct flow design keeps the housing clean, and flexing of the vane in operation prevents any accumulation of scale or sludge. These new flowmeters are in the total flow class so flow eddies due to fittings have little or no effect on accuracy.

The basic design improvement made in these instruments is the flexible vane riveted to the body at one end, leaving the other end free to traverse an arc equal in length to the calibrated scale. A horseshoe section of the flexible vane permits the necessary motion under flow, safely within the elastic limits of the vane. This design eliminates completely delicate component parts such as pivots, bearings, bellows, diaphragms, glass tubes, floats, etc.

Further information may be obtained from Instruments Division, Scully-Jones and Co., 1901 S. Rockwell St., Chicago 8, Ill.

Exhaust Sparks Trapped by Centrifugal Action

Incandescent sparks from the exhaust of internal-combustion engines are trapped by centrifugal force, according to an announcement by the manufacturer of the Gill Spark Arrestor. It is attached on the end of the exhaust pipe. Employing a new application of radiating force, the hot carbon particles are thereby carried to a cup-collector for periodic disposal of the carbon. Exhaust escapes through a large central opening.

In appearance the Gill Spark Arrestor resembles a circular tube with a tangent entrance for the exhaust pipe. It has another tangent tube to which is attached the removable collector-cup for the hot carbon particles. Inside the circular tube is the central slot that permits the escape of exhaust gases.

Built of No. 302 stainless steel and properly engineered, the Gill Spark Arrestor has been thoroughly tested for three years and proved effective where fire hazards from sparks are greatest, according to the maker, Erickson Products Co., 43 Dore Street, San Francisco 3, California. ITS NEW

To Expand Plant

The truck plant of the Wolfard Motor Co. at Portland, Ore., and about 90,000 square feet of land east of the old Vaughn street baseball park has been purchased for occupancy by Cummins Diesel Sales of Oregon, Inc. Purchase price exceeded $250,000. Extensive alterations and a large addition are planned.

The service unit now is equipped to handle the largest of trucks and trailers by means of 12 overhead doors.

GM DIESEL
CASE HISTORY NO. II A6-11

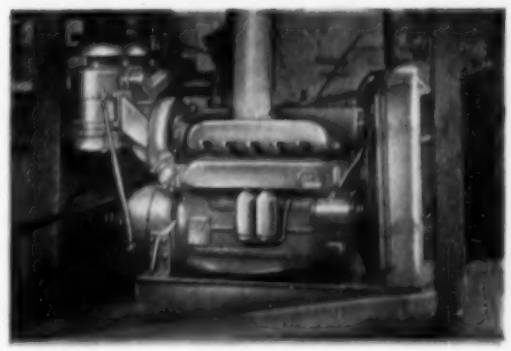
USER: Lowery Bros. Lumber Co., Spurger, Texas

INSTALLATION: GM "6-110" Diesel engine powering Cunningham mill, saw, edger and conveyors.

PERFORMANCE: Producing 25,000 bd. ft. of 1" lumber per day. Co-owner Lester Lowery says, "GM Diesel power actually 'put us in business'—downtime is a thing of the past—we cut faster, cleaner and save money, too."

PRODUCTION TRIPLED

since they switched to
General Motors Diesel



THIS Texas mill was turning out 8,000 bd. ft. of lumber per day with a gasoline engine. The owners put a GM "6-71" to work replacing the gasoline engine in 1952, and boosted production to approximately 16,000 bd. ft. per day. Then, wanting still more power, they switched the "6-71" engine to a portable mill (designed by Lester Lowery) in 1953 and installed a GM "6-110" engine. Production then went to 25,000 bd. ft. per day.

"Higher production at lower cost!" That's the report you'll hear from thousands of operators who use General Motors Diesel power—particularly owners who have stepped up their power with the new "110" engine in sawmills and other equipment. This 300-H.P. GM Diesel operates on the same 2-cycle principle as the famous "71." With every downstroke of every piston a power stroke, it delivers a smooth, steady flow of power that's quick to respond to varying loads—cuts faster, cleaner and more economically.

Operators tell us their GM Diesels run for years without overhaul, but when parts or service are needed they're quickly available at low cost. For full details on GM Diesel power in new equipment—or in your present units—call in your GM Diesel distributor or write:

DETROIT DIESEL ENGINE DIVISION
General Motors • Detroit 28, Michigan
America's Largest Builder of Diesel Engines
Single Engines . . . 30 to 300 H. P. Multiple Units . . . Up to 893 H. P.

GM DIESEL POWER

Straws in Today's Business News

THE CENTRAL RAILROAD Co. of New Jersey has ordered from Fairbanks, Morse & Co., six 2400-hp diesel electric locomotives to cost more than $1.5 million. They will be used for both passenger and freight service and will bring the line's diesel fleet to 188 units. . . . Boston and Maine Railroad directors authorized purchase of one of The Talgo trains built by ACF Industries, Inc. Delivery is scheduled for mid-1956.

THE CALIFORNIA STATE Engineers' office recently employed the Bechtel Corp. to make an independent review of the engineering, economic and financial feasibility of the Feather River Project—first proposed step in the gargantuan "California Water Plan." Estimated cost of the Plan is around $1.6 billion. About one-half billion of this is allotted to construction of the Orville dams, reservoir and power plant. The planned concrete gravity main dam will be 4930 feet long. Its height will be 730 feet with base thickness at stream bed of 680 feet. It will impound 3.5 million acre-feet of water, inundating an area of about 15,500 acres and creating a lake with a shore line of 167 miles. The power plant will generate 440,000 kw of power. Site of the proposed Orville dam is in the Sierra foothills of Northern California. If the project gains legislative approval, water from the lake will be carried by an aqueduct to the extreme southern limits of California. The aqueduct itself will cost considerably more than one billion dollars.

THE CATERPILLAR TRACTOR Co. is in the process of delivering 53 self-regulated diesel-electric sets to the Santa Fe Railroad and six similar units to the Great Northern Railway—all for the purpose of air conditioning new passenger cars. The Santa Fe has scattered stand-by units at strategic terminals along its route and had previously installed 16 such units. Each engine has safety shut-off controls for low oil pressure and high water temperature. . . . As was previously announced in this column, Hall-Scott Motors Co. has under development a six-cylinder diesel engine—its first. In addition, it has been announced that a V-8 diesel and a new "multi-fuel" engine also are under research and design. Hall-Scott, incidentally, received an order from the Navy Bureau of Ships for 56 V-12 Defender-type gasoline engines of 650 hp for use in air-sea rescue craft. Including spare parts, the order amounts to $700,000.

AFTER DIPPING its toe reluctantly in the water, the coal-hauling Norfolk & Western Railway apparently found diesel locomotives to its liking and decided to buy 25 more 1600-hp general purpose diesel locomotives. A company spokesman said the order had not yet been placed but purchase was authorized by the line's Board of Directors. In mid-year this railroad announced purchase of its first diesel locomotives, eight of them, costing $1,400,000, for delivery last September. At least four of these were manufactured by Alco Products. Because the bread-and-butter business of this line has been the transportation of bituminous coal, the railroad was considered a hold-out in the widespread trend to dieselization of railroad motive power.

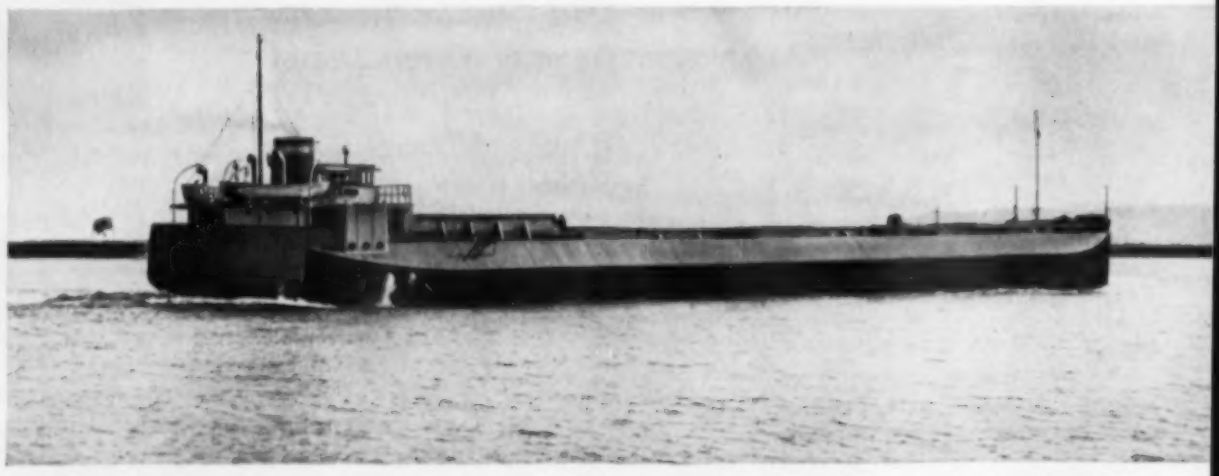
A. K. HUMPHRIES, president, Pacific Intermountain Express, announces M. E. Bealey as PIE vice president, tanker division. Mr. Bealey joined PIE after the latter company had purchased System Tank Lines, Inc. The large liquids hauling organization was operated as a subsidiary, but now has been fully integrated. PIE now has its application with the Interstate Commerce Commission for permission to purchase Collett Tank Lines of Salt Lake City. Collett operates 90 truck-trailer units in Colo-

Frankcliffe Hall . . . shown here on her day of christening, has the largest cargo-carrying capacity of any vessel going through the Lachine Canal, due to the small space requirements of her twin 640 hp. Fairbanks-Morse Marine O-P diesel main engines.

J. B. John . . . since being repowered with two six-cylinder Fairbanks-Morse Marine Diesels, this cement carrier has increased its annual work schedule a full 83%. Better maneuverability is another noted improvement with the 37% more power of new engines.

Full Season Dependability

With Fairbanks-Morse Marine



Blue Cross . . . one of the older vessels on the lakes, is still tops in performance due to her Fairbanks-Morse Marine Diesel power. In the past decade that power has produced a record of 100% availability—not a lost minute, never a lost opportunity to make a trip and add to annual earnings of the ship.

Fairbanks-Morse Marine Service Branches on the Lakes

Buffalo 3, New York · 33-37 Franklin Street
Chicago 5, Illinois · 1550 South State Street
Cleveland 11, Ohio · 3000 West 117 Street
Detroit 13, Michigan · 8655 East Eight Mile Road
Duluth 2, Minnesota · 303 Board of Trade Bldg.
Milwaukee 3, Wisconsin · 404 North Plankinton

rado, Wyoming, New Mexico and parts of Idaho and Montana. . . . Consolidated Freightways, Inc., Portland, Ore., has purchased Silver Fleet Motor Express, with headquarters in Louisville, Ky. and other terminals in Chicago, Indianapolis, Knoxville, Chattanooga, Ashville, and Middlesboro, Ky. Consolidated has been operating about 3000 pieces of equipment and they will acquire 600 more pieces thru acquisition of Silver Fleet.

Telemeter Receivers

Miniaturized Metameter telemeter receivers, which can be used in graphic panel arrangements, have been announced by The Bristol Company of Waterbury, Conn. These receivers are available either as indicators or strip-chart recorders, and occupy a panel space only 5 inches square. Designed to fit into the company's Metagraphic instrument line, the indicators and recorders can be used to receive telemetered signals of any of the usual variables, such as pressure, flow, temperature, differential pressure, and such electrical measurements as voltage, current, and power. They are identical in appearance to the standard Bristol Metagraphic pneumatic transmission instruments for short distance transmission of measurements, and thus provide for uniform appearance in a graphic panel presentation, as well as in conventional instrument panel arrangements.

The miniature receivers make use of the same standard Metameter time-impulse duration mechanism as the full-size models. Further information can be obtained by writing for Bristol bulletin M1710, The Bristol Company, Waterbury 20, Conn. (ITS NEW)

Sales and Service Office Changes

The Houston branch of the White Diesel Engine Division of The White Motor Company has moved to a new location in Houston. Their headquarters are now at 5707 Navigation Blvd. The new office will carry a full stock of spare parts for all engines plus trained service personnel and will offer more complete sales and service facilities for all Atlas and Superior diesel engine owners. A. B. Reese, Jr., White Diesel Engine Division's chief oil field engineer has moved the Fort Worth branch office to 6100 Camp Bowie Blvd. With Mr. Reese are two diesel engine specialists with application experience and technical knowledge to assist diesel engine owners in that area.

New Orleans offices of special representative, G. K. Frink, are 1038 National Bank of Commerce Bldg. Claud Sparkman, field representative for the New Orleans area is available through rig manufacturers or by direct call.

Arthur Divic's Sons, Inc., Marine Suppliers, continue their franchise as distributors in the central Gulf Coast Area for both Atlas and Superior engines. Oil field engines are available through the leading rig manufacturers.

Eastern Regional Sales Manager

A. W. (Cap) Barr has been promoted to the position of eastern regional sales manager for Penn Controls, Inc. of Goshen, Indiana, officials of that firm have announced. Headquarters will be in Philadelphia. Since joining the Penn company 17 years ago, Mr. Barr has been district manager of the firm's Boston sales office responsible for much of the New England area.

In announcing Barr's promotion, the company also disclosed the appointment of James Garrett as its new district manager in Boston. Mr. Garrett has served the past several years in that office as sales engineer. The new regional sales manager will be responsible for sales activities in Penn's Philadelphia, Boston, New York and Rochester offices.

Iroquois . . . powered by a total of 1280 Opposed-Piston horsepower, this most modern of canal-size freighters carries iron ore from Montreal to lake ports —and returns cargoes of grain. Compact O-P power permitted designing 176,000 cu. ft. hold capacity.

Diesel Power

Here is a partial list of vessels that ply the Great Lakes and St. Lawrence, powered by Fairbanks-Morse Marine Diesel Engines.

Power, speed and maneuverability, and proved low maintenance—that is the record of F-M power that means higher annual work schedules, higher vessel earnings, full season dependability for these carriers. Low fuel costs can be still lower on F-M Marine Diesels using Bunker "C" fuel oil.

See what this performance and economy can do for your vessel . . . see your nearby Fairbanks-Morse Marine Specialist. Find out the full meaning of . . . More Power to You . . . with Fairbanks-Morse Marine Diesel Power. Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill.

FAIRBANKS-MORSE
a name worth remembering when you want the best

DIESEL AND DUAL FUEL ENGINES • DIESEL LOCOMOTIVES • RAIL CARS
ELECTRICAL MACHINERY • PUMPS • SCALES • HOME WATER SERVICE EQUIPMENT
MOWERS • MAGNETOS

Name of Vessel	Horsepower of F-M Engines
Havre Aux Maisons	320
Havre-Aubert	320
Maid of Clare	240
Griffon	1800
Tecumseh	1800
Belvoir	1800
Eskimo	500
Lady Cecil	580
Donald Sawyer	3600
John Chapman	3200
Alfred J. Harris	3200
Donnacona No. 3	320
Donnacona No. 2	320

A Partial List Fairbanks-Morse Powered St. Lawrence and Great Lakes Carriers

Sault aux Moutons	400
News Carrier	400
Mont Logan	250
Fort Ramsay	240
Atr 4	3200
Cedarbranch	1600
Transiland	1600
Coastal Creek	1050
Hutchcliffe Hall	1280
Eastcliffe Hall	1280
Amanda Transport	240
Malbaie Transport	200
Blue Cross	1000
Blue River	1000
Iroquois	1280
Frankcliffe Hall	1280
Richard J. Barnes	360
Robert Barnes Fiertz	360
Julius H. Barnes	900
Buckeye State	400
Carport	1280
J. B. John	330
Michigan	550
U.S.C.G. Mackinaw	13,200

Canadian—Fairbanks-Morse

Fort William, Ontario, 300 Simpson Street · Halifax, Nova Scotia, 164-166 Granville Street · Montreal 3, Quebec, 980 St. Antoine Street · Quebec City, Quebec, 255 Boulevard des Capucins
Saint John, New Brunswick • 75 Prince William Street · Toronto, Ontario • 136 167 Harbour Street · Windsor, Ontario • 357 Pitt Street, East

...and we quote...

A design engineer writes about DIESEL ENGINE CATALOG, Volume 20 . . . "It has the attractive make-up and complete presentation for which it has been known and which makes it an excellent source of information."

An accessory manufacturer writes . . . "The model identifications of the various diesel engines will be valuable to us in our efforts to accumulate engine torque specifications."

A top filtration expert writes . . . ". . . have been through DIESEL ENGINE CATALOG, Volume 20, from cover to cover and can only say I would not think it was possible to make so many improvements over the last issue. It is a magnificent job and I know it will be used frequently by me."

DIESEL ENGINE CATALOG
Volume Twenty

DIESEL ENGINE CATALOG can serve you too as it is serving thousands of diesel men. Whether you buy, sell, repair or service diesel, dual-fuel or gas engines, you need DIESEL ENGINE CATALOG, Volume 20.

published by

DIESEL PROGRESS

Cole Station — Los Angeles 46, California

To reserve your copy of DIESEL ENGINE CATALOG, Volume 20, fill in and mail the coupon below. $10.00 post-paid (Add state and local taxes for California delivery.)

Please send me Volume 20, DIESEL ENGINE CATALOG. I enclose $10.00 ..... Bill me .....

..... Name

..... Company

..... Street Address

..... City ..... Zone ..... State

Tool for Small Earthmoving Jobs

The accompanying illustration shows a unique arrangement of a small diesel wheel tractor scraper combination for earthmoving work. This is a valuable tool for use in housing projects and construction jobs where only light and easily maneuvered equipment is needed for earthmoving chores.

The tractor shown is a Minneapolis-Moline Model GB diesel tractor, delivering 56 horsepower at the drawbar. This tractor is powered by a Minneapolis-Moline 6 cylinder diesel with a 4¼ in. bore and 5 in. stroke. The wheel scraper is built by the Soil Mover Company and has a 4 cu. yd. capacity. The scraper is hydraulically controlled from the tractor. The illustration was taken on a housing development job under contract to the Fred Swanson and Sons construction firm of Hopkins, Minnesota.

Manager of Railroad Products

V. J. Niederriter

V. H. Peterson, Vice President—Railroad Sales, Fairbanks, Morse & Co., has announced the appointment of V. J. Niederriter as Manager of the Railroad Products Department, Railroad Division, with offices at the Company's headquarters at 600 S. Michigan Avenue, Chicago. He succeeds Mr. William G. Herzig who has resigned to take a special assignment with the Chicago Branch of the corporation.

Bulletin

New literature published by Electric Machinery Mfg. Company, Minneapolis, illustrates the new "Ampli-Speed" magnetic drive, which provides precise, adjustable speed power for a wide range of applications. The four-page folder explains use of the drive for both fan-type (centrifugal fans, pumps, compressors) and constant torque loads (conveyors, mixers, machine tools, etc.).

Construction features are illustrated clearly. Pictorial drawings show the relationship of the drive to its magnetic amplifier control, the driving motor and driven load. The "Ampli-Speed" drive, it is pointed out, can be installed between the existing motor and load, or as an integral part of new machinery. The folder lists many advantages obtained by means of this source of speed control, and gives detailed information on horsepower ratings, speed ranges, and speed control precision for both variable torque and constant torque loads, and also shows important dimensions.

Copies of the bulletin, number 4400-PRD-229, are available on request from Electric Machinery Mfg. Company, Minneapolis 13, Minnesota.

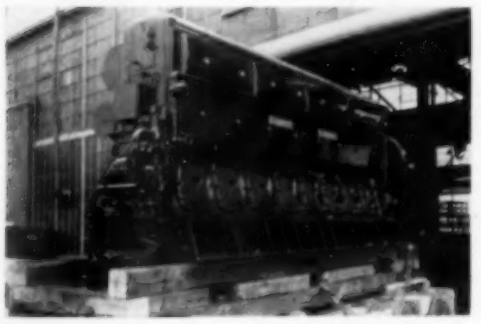
Vice President of C. Lee Cook Co.

William H. Barnes

The election of William H. Barnes as vice president and general sales manager of the C. Lee Cook Company, Louisville, has been announced by Philip W. Mettling, President. Effective date was November 1. Before joining C. Lee Cook, Mr. Barnes had been associated for ten years with Clark Brothers Company in Tulsa. For the past two and a half years he was district manager of Clark Brothers' Tulsa district. He previously had been with the Standard Oil Company of Indiana, and the Standolind Oil and Gas Company.

C. Lee Cook Company manufactures a quality line of industrial piston rings, metallic packings and valve plates.

White Diesel Delivers Engine



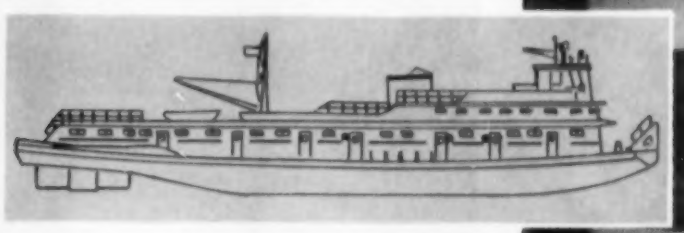
Leaving the Springfield, Ohio plant of the White Diesel Engine Division of The White Motor Company, is this 2000 hp Superior diesel which will power a dredge for Price Bros.-McClung, Inc. of Toledo. First engine to be sold with improved output, this Model 65 type had formerly produced 1765 hp. Improvements in supercharging and exhaust manifolding have allowed the continuous hp rating to be increased to 2000 hp, with ample reserve still available in the original design.

IT'S HERE! JUST OFF THE PRESS! Bigger, better, completely revised, rewritten and brought up to date. It's Volume 20 of DIESEL ENGINE CATALOG, now ready for mailing. Mail orders are now being filled for this giant reference book with its all-new, profusely illustrated engine and accessory section. Be sure of your copy of this limited edition, which costs $10 postpaid plus California sales tax where applicable. Send checks or company form orders to DIESEL PROGRESS, Cole Station, Los Angeles 46, California.

Another

LAKE SHORE SWITCHBOARD INSTALLATION

with Autostatic Voltage Regulators



A D HAYNES II

Power from the two diesel generator sets is distributed to 38 circuits through the compactly-designed Lake Shore Switchboard. Autostatic Voltage Regulators are used on each of the 144 KW, 3 Phase, 60 Cycle, 480-Volt generators. Maintenance-free service is assured with the Autostatics as they are of the magnetic amplifier type, containing no moving parts to wear or jam.

Request data on Lake Shore-designed Diesel Generator Controls, Switchgear, Integrated Marine Propulsion and Automatic Process Control Systems.

LAKE SHORE ELECTRIC CORP.

★

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STRATOFLEX OF CANADA, INC. TORONTO 18, ONTARIO

"Baby Lere" Performance

THE new 3280-hp towboat, *Baby Lere*, was designed and built by Nashville Bridge Co. for the Nashville Coal Co., Inc., Uniontown, Ky. Measuring 139½ ft. in length by 35 ft. in breadth with a normal draft of 7 ft. 9 in., the heart of the boat is the engine room. With every inch of space put to good use, there is still plenty of room for free movement in this engine room. Located here are the two GM, 16-cylinder, Model 16-278A diesel engines. Each is rated 1640 hp at 750 rpm. They drive through Falk reverse and reduction gears with 2.543:1 ratio. The 84 in. diameter four-blade stainless steel propellers turn at 295 rpm.

Both main and auxiliary engines are cooled by circulating the jacket water through the Nabrico closed, skin cooling system. Ross lube oil coolers and Briggs lube oil purifiers are used on this modern vessel. Two Nabrico air steering systems are installed. One operates the two steering rudders. The other handles the two flanking rudders. These systems make it possible to operate the rudders from hard over to hard over in 10 seconds.

Two GM 2-cycle, 6-cylinder, Model 6-71-RC-7 diesel engines, each connected to a 60-kw, 450-volt, 3-phase, 60-cycle generator with navy-type dead front switchboard, supply the electrical power.

With this sort of design and construction, it is a good prediction that the birth of the *Baby Lere* is a blessed event on the inland waterways, a worthy addition to the fleet of one of the outstanding river operators. It's doing the man-sized job it was built for—serving the Marine Transportation Department of Nashville Coal.

"What Is A Forging?"

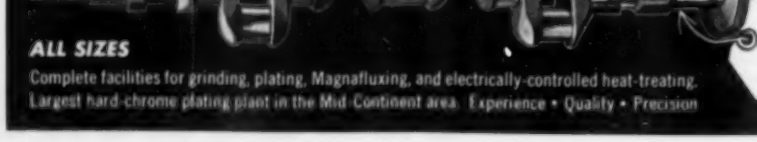
A new 8-page booklet entitled "What Is a Forging?" describes, almost without a technical term, how the forging idea originated and grew, how forgings are made, and the important part forgings play in everyday products. Simple, clear pictures and drawings are provided. Copies may be obtained by writing the Drop Forging Association, 419 South Walnut Street, Lansing 33, Michigan.

New Drilling Equipment

The Taylor Dynamometer & Machine Company, Milwaukee, Wisconsin, manufacturers of "Hi-Eff" equipment, have added a new model to their line of "Hi-Eff" sensitive drilling machines, according to an announcement made by Arthur C. Flamme, sales manager. The new unit, designated "Series C, Model 64" is, like its component units "Series A" and "Series B," designed for quality, sensitive precision drilling on a production basis. However, the Model 64 will sell at a lower price than other Taylor drilling machines. The new Model 64 includes most of the features found in the "Series A" and "Series B" machines. The combined run-out of spindle and chuck will be held to .0005-in. or better, with variable spindle speeds from 800 rpm to 10,000 rpm. The range of holes that can be drilled will be from .001-in. to .125-in.

The Model 64 drilling machine was styled by Jack Collins, S.I.D., an outstanding industrial designer. The equipment is very compact. Housing, pedestal and base have been given clean-cut, modern lines. Descriptive literature will be sent on request. Taylor Dynamometer & Machine Company, 6411 River Parkway, Wauwatosa 13, Wisconsin. (ITS NEW)

Grinding and Hard-Chrome Plating of Diesel Engine Crankshafts



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White Promotions

Thomas J. Delaney Roy A. Fryer

Thomas J. Delaney has been named director of advertising and sales promotion for the White Motor Company, it was announced by P. E. Tobin, general sales manager. R. A. Fryer has been named assistant director of the enlarged department, with headquarters at Cleveland. The two promotions were made in line with the consolidation of the Autocar and White sales promotion departments and the expansion of the sales program "under a plan aimed to coordinate this phase of the company's activities," Mr. Tobin said.

Mr. Delaney was formerly director of sales promotion and advertising for White's Autocar Division. He joined Autocar more than 20 years ago as a salesman, later advancing to director of manufacturing research and public relations director.

Mr. Fryer has been manager of the White sales promotion department for the past five years and has been with White for the past twelve years.

Purchases Fleet of Tractors

Herbert Smith, International Harvester Company, (second from right) points out one of the features of the Cummins 175 hp Model JT-6-B Turdodiesel, that is used to power the 25 new IH tilt-cab tractors now being placed into service by S & W Motor Lines, Inc., Greensboro, North Carolina. Listening to Mr. Smith, (left to right) are R. R. MacDonald, Piedmont regional manager, Cummins Engine Company, Inc.; George H. Sharp, president, S & W; and J. R. Brown, Jr., vice-president, S & W.

An expansion and modernization program costing in excess of one-half million dollars, which includes the purchase of a new fleet of 25 turbo-diesel tilt-cab tractors and 25 volume van trailers, has been announced by S & W Motor Lines, Inc., Greensboro, N. C. George H. Sharp, president, says this represents the replacement of approximately one-third of S & W's present over-the-road equipment.

"The new tractors and trailers were purchased after we made an exhaustive survey of our operation and our equipment needs. We were in need of lightweight diesel tractors that would pull 35-ft.-high volume trailers," Mr. Sharp said. International Harvester tilt-cab 205's with 175-hp JT-6-B Cummins Turbodiesels, were specified along with 35-ft. "hi-cube" Strick trailers. These units will be used between Greensboro and points in North and South Carolina, Virginia, West Virginia, Pennsylvania and Ohio. S & W has common carrier rights east of the Mississippi with exception of the six New England states.

Mr. Sharp said that turbocharging has made possible a lightweight diesel with enough horsepower, and excellent fuel economy characteristics, to haul 30,000 pound payloads over mountain roads, and at the same time maintain fast trip schedules. He expects these units to average 85,000 miles a year in this service. An additional order for Cummins-powered units has been placed with International Harvester, and they should go into service sometime this fall.

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Eaton Diesel Engine Valves are produced to meet the exacting requirements of Diesel engine service. Through more than 35 years of co-operating with the country's leading Diesel engine manufacturers, and furnishing valves to them, Eaton has developed a thorough understanding of the problems peculiar to the Diesel field. Eaton's experience is reflected in the outstanding performance records achieved by Eaton-made valves in all phases of Diesel engine service.

Eaton Diesel Valves are produced in a wide range of materials, and in both faced and unfaced designs.

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Mid-Continent Diesel News

By **Jack F. Cozier**

PERRY JONES Construction Co., Carbondale, Kan., purchased an Iowa 40 in. x 33 in. Hammermill powered by a model 12103 GM dieselized unit from the K C Diesel Power Co., North Kansas City, Missouri.

N. V. DUNCAN Drilling Co., Fairfield, Ill., bought two Le Roi L-3000 twelve cylinder gas engines to repower an Oil-well rig with the sale being made by the Carson Machine & Supply Co., Oklahoma City, Okla.

UNIT RIG & EQUIPMENT Co., Tulsa, Okla., purchased two 8MO-1290 Buda natural gas torque converter engines to power a Unit U-36-A drawworks. The engines were sold by Buda Engine & Equipment Co., Tulsa Okla., and the rig will be delivered to a Wyoming drilling contractor.

JACK DURETT, Keota, Okla., has bought a Euclid TS-18 twin powered 18 yard scraper powered by a GM 6110 diesel on the front and a GM 671 diesel on the rear with both engines torque converted and both engines single or dual actuated. The unit which will be used for highway work was sold by the Butler-Sparks Equipment Co., Tulsa, Okla.

CITY OF AUGUSTA, Kansas, purchased two LSV-12-GDTSG Cooper-Bessemer tri-fuel units, rated at 1850 kw 15½ x 22 in. bore and stroke develop 327 rpm. The units will go in the city municipal light plant where they are building a new building to accommodate the new units. Augusta has two Cooper-Bessemer LS-8GDT units already in operation.

OKLAHOMA PAVING CO., Miami, Okla., has repowered a Lima shovel with a GM model 4055 diesel engine from the Diesel Power Co., Tulsa, Okla. The shovel will be used for general contract work.

STANDARD INDUSTRIES, Inc., Tulsa, Okla., bought one Cat #12 motor grader, one Cat D8 torque converter tractor and one 22-B Bucyrus-Erie transit crane for road construction in Tulsa county from McCormick Machinery Co., Tulsa, Okla.

WATSON DRILLING CO., Winfield, Kan., has taken delivey on a GM model 12103 OH diesel engine for installation on a Wilson Giant drawworks. The unit was sold by Diesel Equipment Co., Inc., Wichita, Kan.

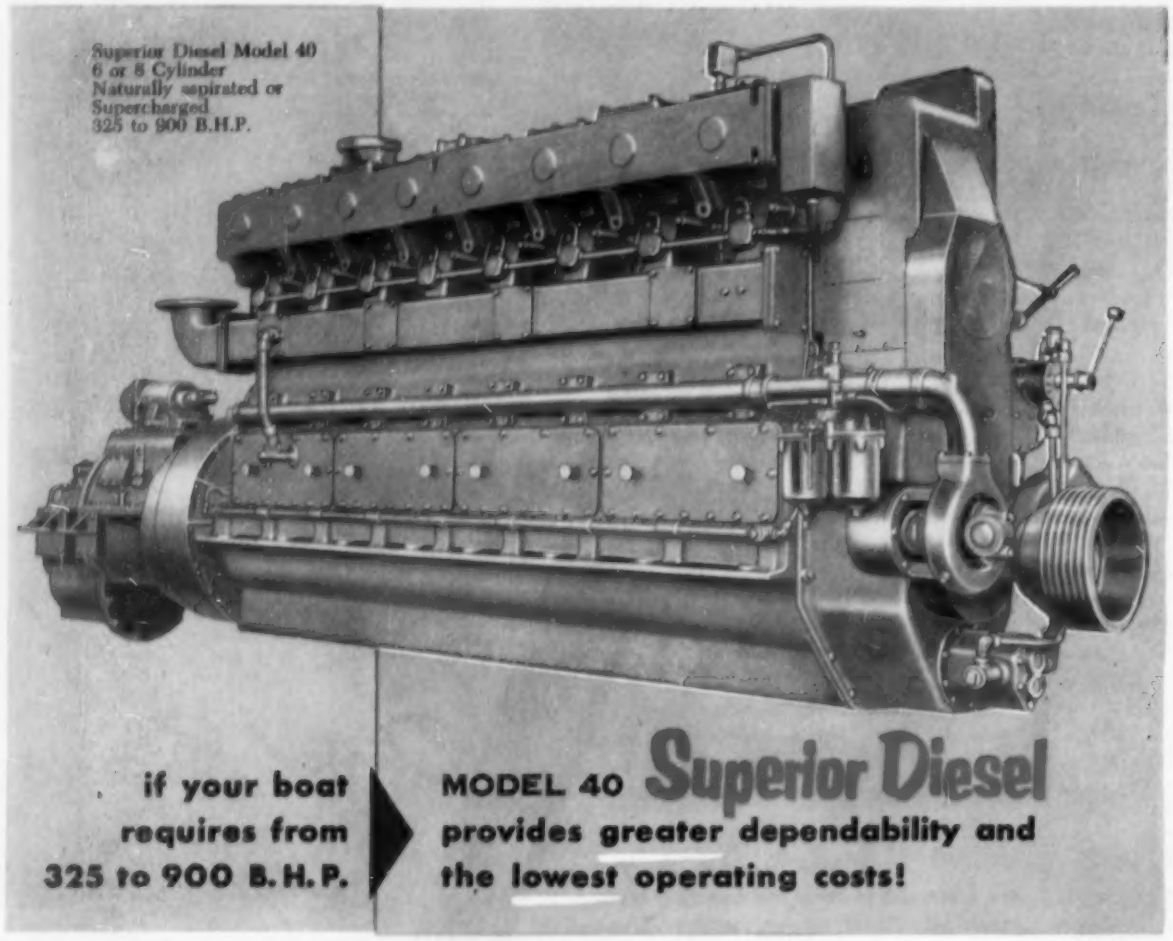
POWER TRANSMISSION & Equipment Co., Seminole, Okla., received two Buda 8MO-1290 natural gas engines for a drilling rig from Buda Engine & Equipment Co., Tulsa, Okla.

INDUSTRIAL MACHINE & Tool Co., Tulsa, Okla., has purchased two Unit 1520 cranes with 451 GM diesel engines and one Unit 1520 T with a 451 GM diesel and torque converter from Engine & Equipment Co., Tulsa, Okla.

W. D. JEFFREY Construction Co., Fort Smith, Ark., bought a Cat D8 tractor with torque converter for use on the Tulsa-Joplin toll road from McCormick Machinery Co., Tulsa, Okla.

ANDERSON & OXANDALE, Holton, Kan., purchased a 30 in. x 33 in. Iowa hammermill powered by a GM model 62403-RA diesel unit from the K C Diesel Power Co., North Kansas City, Missouri.

KNIGHT MANUFACTURING & Supply Co., Tulsa, Okla., took delivery on a Buda PC-1879 natural gas engine to power a gas compressor in northern Oklahoma. The sale was made by Buda Engine & Equipment Co., Tulsa, Okla.



For the utmost dependability and greatest operating economy in tugs, towboats, dredges, fishing vessels and other workboats, there's no better power plant than the Superior Model 40! This rugged, diesel engine can provide more years of trouble-free, profit-boosting performance at the lowest possible operating costs . . . . here's why:

FUEL SAVING COMBUSTION SYSTEM saves up to 35% fuel consumption compared with other engines in very similar hulls. Improved air intake and scavenging, combined with most ideally designed combustion chamber, make these big fuel savings possible.

STATICALLY-DYNAMICALLY BALANCED CRANKSHAFT carried on long-life, precision bearings provides practically vibration-free operation, reduces wear on engine accessories, permits faster acceleration.

EXTREMELY RIGID MARINE BEDPLATE resists hull distortion effect on engine, provides better alignment with propeller shaft thereby reducing vibration. It absorbs firing thrust, reduces stress on the block to greatly lengthen engine life.

SIMPLICITY OF RUGGED CYLINDER BLOCK provides larger than usual access to bearings, camshaft and fuel pumps for easier routine maintenance. Keeps down-time for servicing to a minimum.

INDIVIDUAL CYLINDER HEADS, LINERS, FUEL PUMPS are specifically designed for longest service life. This simplifies maintenance, provides greater performance dependability.

Whether you're choosing a diesel for a new boat or repowering, you can rely on the Superior Model 40 for longer service life, lowest maintenance, fuel, and lubrication costs! Get complete details at your nearest sales and service office listed below.

Superior ENGINES ATLAS Imperial DIESEL ENGINES White DIESEL

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SAPULPA TANK CO., Sapulpa, Okla., has received a GM diesel model 6043-C 100 kw generating unit to power some Lincoln welding units. The sale was made by Diesel Power Co., Tulsa, Okla.

TULSA WATER DEPARTMENT, Tulsa, Okla., has bought a Bucyrus-Erie Hydra-crane for water main maintenance from McCormick Machinery Co., Tulsa, Okla.

STANDARD INDUSTRIES, Tulsa, Okla., has taken delivery on two S-7 Euclid seven yard scrapers powered by 471 GM diesels. The units which were delivered by Butler-Sparks Equipment Co., Tulsa, Okla., will be used on paving contracts.

HASZ WELL WORKS, Scott City, Kan., purchased a GM model 4030C diesel engine from the Power Equipment Co., Dodge City, Kan., dealer for the Diesel Equipment Co., Inc., Wichita, Kan.

W. G. BURGESS Construction Co., Tulsa, Okla., bought a Cat DW15 tractor and scraper for use on the Tulsa-Joplin toll road from the McCormick Machinery Co., Tulsa, Okla.

JOHN HEARD, drilling contractor, Cleveland, Okla., has received two LeRoi H844 gas engines, one going on a Brewster rig in service and another on a National T-12 rig. The sale was made by the LeRoi Co., Tulsa, Okla.

MIDWESTERN CONSTRUCTORS, Tulsa, Okla., purchased a Unit 1020A back hoe powered by a GM 471 diesel. The unit will be used for pipe line work and was sold by Midwestern Engine & Equipment Co., Tulsa, Okla.

MOORMAN CONSTRUCTION CO., Muskogee, Okla., received one Cat 955 Traxcavator, and one #12 Cat motor grader for use on the Tulsa-Joplin toll road. The sale was made by the McCormick Machinery Co., Tulsa, Okla.

PIPELINE SERVICE CO., Seminole, Okla., has purchased a 600 Chicago Pneumatic rotary compressor for construction powered by a 671 GM diesel from Leland Equipment Co., Tulsa, Okla.

PERRY JONES Construction Co., Carbondale, Kan., bought two Osgood model 820 1½ yard shovels powered by two GM model 6057-C dieselized units from the K C Diesel Power Co., North Kansas, Mo.

PETE TUMELSON CONTRACTING Co., Tulsa, Okla., purchased two Oliver model 55 diesel wheel tractors for yard excavations around housing developments. The sale was completed by Midwestern Engine & Equipment Co., Tulsa, Okla.

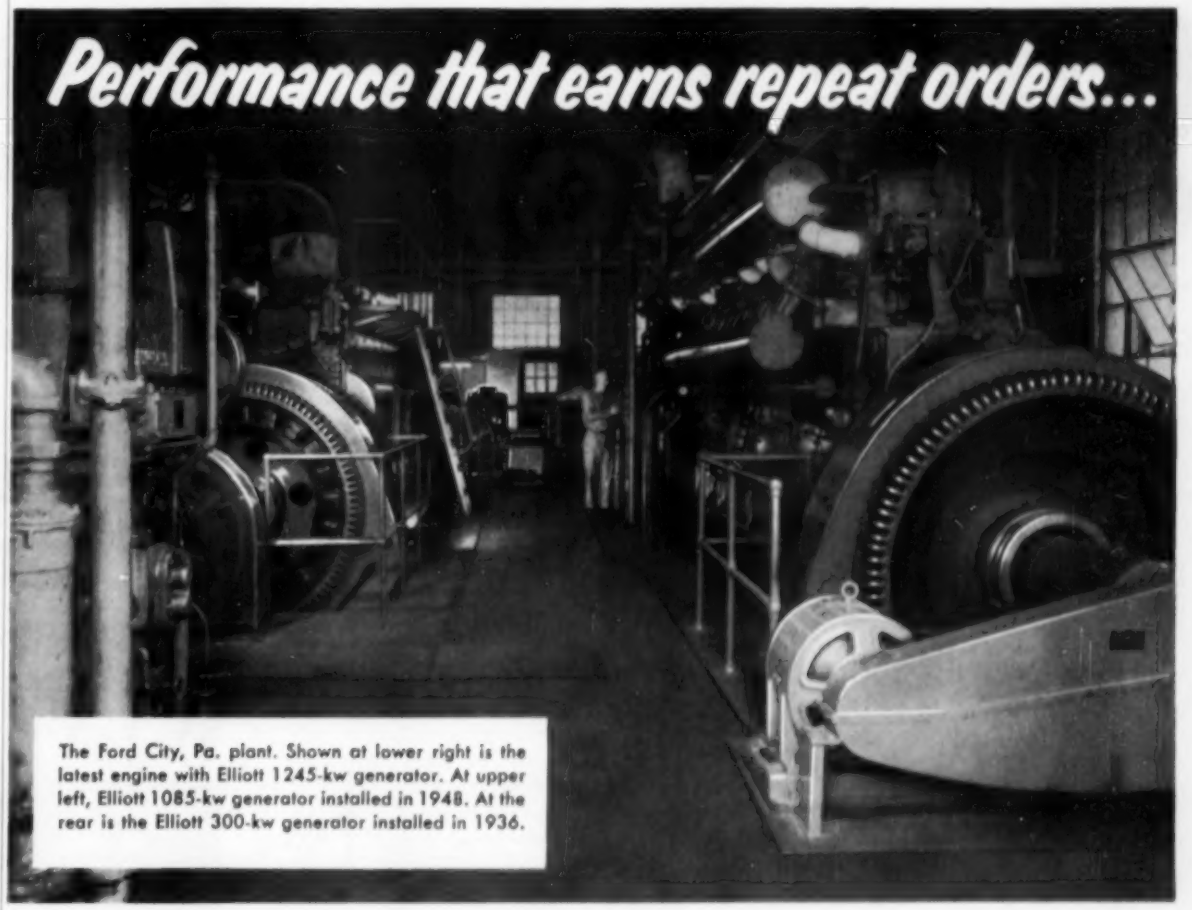
FRIX-FOSTER Construction Co., Muskogee, Okla., received one Cat DW21 scraper for work on the Tulsa-Joplin toll road. McCormick Machinery Co., Tulsa, Okla., delivered the unit.

W. D. BURGESS, Tulsa, Okla., bought two Euclid 23-TRT 15½ yard scrapers with power supplied by GM model 6110 diesels through torque converters. Butler-Sparks Equipment Co., Tulsa, Okla., made the sale.

FIELD QUEEN, Inc., Maize, Kan., received two GM model 3031 LH diesel engines from Diesel Equipment Co., Inc., Wichita, Kan.

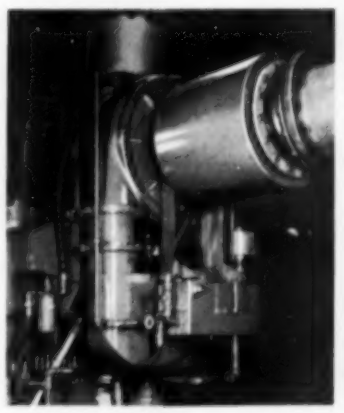
INDIAN DRILLING CO., Tulsa, Okla., purchased a new Ideco rig powered with GM model 12105 diesels from the Diesel Power Co., Tulsa, Okla.

W. E. LOGAN CONSTRUCTION Co., Muskogee, Okla., bought a Cat D9 tractor for work on the Tulsa-Joplin toll road from McCormick Machinery Co., Tulsa, Okla.



The Ford City, Pa. plant. Shown at lower right is the latest engine with Elliott 1245-kw generator. At upper left, Elliott 1085-kw generator installed in 1948. At the rear is the Elliott 300-kw generator installed in 1936.

ELLIOTT Generators and Turbochargers

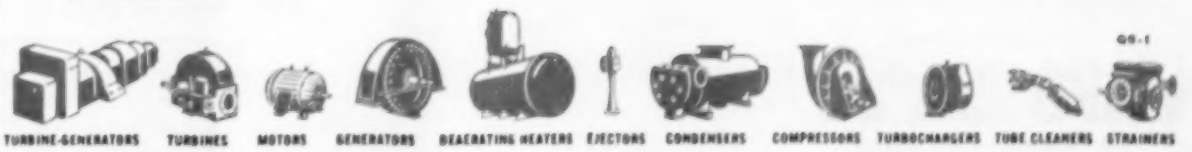


Close-up of the Elliott turbocharger serving the engine installed in 1954. Another Elliott turbocharger serves engine installed in 1948.

Twenty years ago, the Ford City, Pa. municipal plant installed its first diesel generating unit and an Elliott 300-kw generator went on the job. Since then additional units have been added three times—1941, 1948 and 1954. Each time Elliott generators got the call and in 1948 and 1954, Elliott turbochargers were also included. It's another case of steady, trouble-free performance for Elliott generators and turbochargers. It pays to specify them everytime.

For complete information, consult your local Elliott Field Engineer or write Elliott Company, Jeannette, Pa.

ELLIOTT Company



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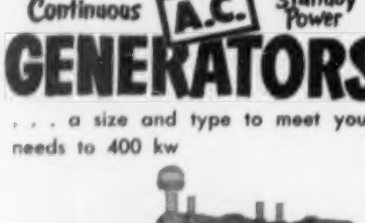
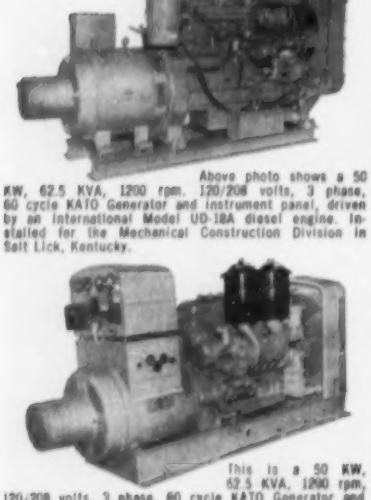
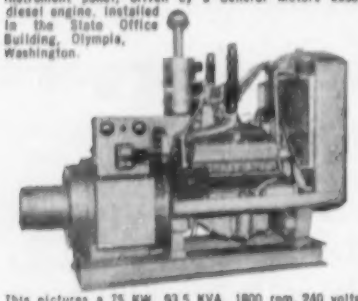


Above photo shows a 50 KW, 62.5 KVA, 1200 rpm, 120/208 volts, 3 phase, 60 cycle KATO Generator and instrument panel, driven by an International Model UD-18A diesel engine. Installed for the Mechanical Construction Division in Salt Lick, Kentucky.



This is a 50 KW, 62.5 KVA, 1200 rpm, 120/208 volts, 3 phase, 60 cycle KATO Generator and instrument panel, driven by a General Motors 6030C diesel engine. Installed in the State Office Building, Olympia, Washington.



This pictures a 75 KW, 93.5 KVA, 1800 rpm, 240 volts, 3 phase, 60 cycle KATO Generator and instrument panel, driven by an H-540 Leflol engine utilizing natural gas for fuel. For Republic Steel Corporation of Gary, Ind.

An illustration of KATO's versatility: A 350 watt KATO Generator driven by a Lauson LMH engine and a 150 KW, 187.5 KVA, 750 rpm, 120/208 volts, 3 phase, 25 cycle KATO Generator and instrument panel—driven by a General Motors twin 6-71 diesel engine. For Duluth, Mesabi & Iron Range Railway.

Your Inquiries Invited.

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1443 First Avenue, Mankato, Minnesota

More Than A Quarter Century of Activity

The 1956 annual technical sessions and exhibits of the Oil and Gas Power Division of the American Society of Mechanical Engineers will mark the 27th year this activity of the Division. The first exhibit took place at Penn State, State College, Pa. The attendance and exhibits demand increased steadily with every succeeding year, soon outgrowing the colleges.

Many firms which have exhibited since its inception can testify to the effectiveness of these meetings as they were rotated around the country. The 1956 meeting will take place during the early part of April, 1956 at the Jung Hotel in New Orleans. The theme will be "Marine and Pipeline, Oil and Gas Power."

Reservations for exhibit space are being accepted by R. A. Schakel, Diamond Chain Company, Inc., 407 Kentucky Ave., Indianapolis, Indiana.

A New Additive

Costly diesel engine maintenance due to galled injector pumps, injector nozzles becoming plugged and burned, rusted tanks due to water in the fuel and collection of sludge, it is claimed, can now be effectively curtailed with Diesel Dope. Diesel Dope is a newly developed additive that adds right to the diesel fuel and the manufacturers claim that regardless of degree of inoperation immediate results are apparent. Tests on highway equipment and contracting equipment have proven it to be the answer to high maintenance costs due to the above mentioned conditions.

Actual tests made on a piece of rolling equipment rendered 127,000 miles of road use through all seasons of the year without one idle day due to injection trouble. Compared to similar rolling equipment the costs in terms of savings were $1.00 spent for Diesel Dope compared to $56.60 of comparable maintenance costs. Extensive tests have been completed after three years, and all types of equipment used were reported to be in excellent condition by one of America's largest diesel engine manufacturers. Diesel Dope is sold exclusively by the Fuel Additive Division, Everold Co., Box 231, Villa Park, Ill. ITS NEW

Chain Couplings

Dodge Taper-Lock chain couplings have recently been added to the line of Taper-Lock sprockets and roller chain, which was introduced by Dodge of Mishawaka more than a year ago. The new Taper-Lock chain couplings are of a flexible type and permit sufficient relative movement between the hubs to accommodate slight angular and parallel shaft misalignment. The coupling provides a strong and positive, yet compact, direct coupling of the shafts.

Among the value features of the new couplings are Taper-Lock bushings. These bushings are available immediately from distributors' stocks in the desired sizes – no reboring is required. They make easy installation upon full size or normally undersized shafts, yet give the equivalent of a shrunk-on fit. The chain is a double-width, standard precision chain conforming to American Standard Association specifications.

Taper-Lock sprockets and chain couplings and Dodge roller chains are carried in stock by distributors.

EMD Personnel Changes

Two promotions and one new appointment have been announced by Electro-Motive Division of General Motors. B. B. Brownell, chief engineer, has announced the promotion of T. B. Dilworth to executive engineer of EMD. Guy D. Briggs, Jr. was moved up to the position of comptroller according to N. C. Dezendorf, general manager of EMD. Frederick W. Walker, Jr. has taken over as manager of the Chicago region to succeed George W. Rukgaber, recently transferred to the locomotive division of GM's overseas operations. The change was announced by Paul R. Turner, director of sales of EMD.

Assistant Manager

Appointment of Duane F. Kuntz as an assistant manager of motor truck sales has been announced by W. C. Schumacher, vice president and general manager of International Harvester Company's motor truck division. Mr. Kuntz previously was manager of the company's southwest motor truck sales region.

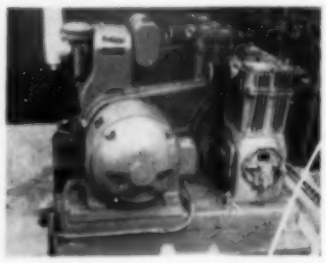
TRIPLE PLAY AT FLOOD TIME

by Cecil Diesel
ROVING REPORTER

As one Oakland city official puts it, "We're so sure those Quincys will always start, we don't even have an attendant here." Even if all electric power would fail, gasoline-powered Quincys start the diesels anyway . . . and supply air for controls.

OAKLAND, CALIF. — The place: a storm water pumping station. It's been raining for hours. Will streets flood and cause costly water damage? Listen for the triple play.

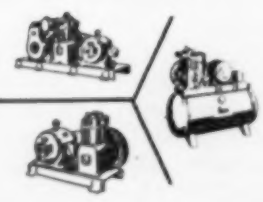
Diesels start purring . . . pumps start pumping . . . and Quincy Model D340 Compressors start humming. Here's what's happening. Flood water level rouses four pump-driving Enterprise DSG-518 Diesels to action. Then as tank air pressure drops below 220 pounds, Quincy Compressors automatically start . . . build pressure back up.



And there's a Quincy Compressor for every diesel starting job. Let Quincy help you select the right model from a range of mountings and sizes — from 1 to 90 CFM. Write them for a catalog.

Quincy COMPRESSORS

QUINCY COMPRESSOR CO.
DEPT. K-47, QUINCY, ILLINOIS



World's finest air compressors

Special Tool Bulletin

The Kent-Moore Organization Inc. has just released a new 48 page GMC Truck special service tool manual containing complete information on all the Kent-Moore Rate-Maker special tools required to perform factory-recommended service on GMC gasoline and diesel trucks. Prepared with the GMC truck service man in mind this new manual describes and illustrates hundreds of special service tools for servicing axles, brakes, clutches, transmissions, fuel systems, engines, steering mechanisms and other assemblies. These tools are designed tested and manufactured to enable the service man to duplicate factory-assembled conditions and specifications and to perform the essential maintenance operations for which no adequate standard tools exist.

This manual is free for the asking, no cost, no obligation. Write to Kent-Moore Organization, Inc., 5-105 General Motors Building, Detroit 2, Michigan.

Diesels for New York Sewage Plant

The first two of four Enterprise tri-fuel diesel engines have been accepted for New York City's enlarged Bowery Bay Pollution Control Project. Installation of all four diesels is scheduled for completion early next year. The engines are being supplied as part of a $12,477,000 prime contract held by J. Rich Steers, Inc., for construction of this phase of the Bowery Bay plant expansion. Against an original plant capacity of 40 mgd, the enlarged plant will boast triple that figure, or 120 mgd.

In normal operation the Enterprise engines will run on sewage gas, supplemented by diesel oil as necessary, developing 1755 hp each at 360 rpm. Driving four 1250 kw General Electric generators, they will provide power for blowers and main sewage pumps in the enlarged plant. This type of engine use features fluctuating loads and a varying fuel supply, conditions that are efficiently met by the tri-fuel adaptability of Q-series Enterprise diesels. The Bowery Bay plant extension was designed by the New York City Department of Public Works, Fred H. Zurmuhlen, P.E., R.A., commissioner.

Mack Names Two Executives in Sales Staff Expansion

Two new sales executive appointments were announced by Elliott G. Ewell, vice president of Mack Trucks in charge of sales, as part of an expansion of the administrative staff to keep pace with the company's growth and diversification. The new appointees are Lewis E. Minkel, vice president and sales manager and Gerald F. Jones, vice president and executive administrator.

Mr. Ewell said that Mr. Minkel will direct all field sales activities of Mack trucks, buses and fire appartus and Mr. Jones will supervise branch operations, all service, parts, sales engineering and plant liaison activities.

Signs Equipment Contract

The Trane Company, manufacturers of air conditioning, heating, ventilating and heat transfer equipment, disclosed that it had signed a sales contract to furnish Gregg Co., Ltd., Belgian builder of railroad cars for service in foreign countries, with railroad air conditioning and refrigeration equipment. Products which Trane will furnish Gregg under this new agreement include compressors, condenser and evaporator coils, and condenser and evaporator fans.

According to Trane vice-president H. Corbyn Rooks, the Gregg arrangement is expected to facilitate the sale of Trane railroad equipment outside the continental limits of the United States. Gregg has been building railroad cars of all types for more than 50 years and is said to have one of the largest and most modern plants in the world devoted exclusively to the manufacture of railroad cars for foreign consumption. U.S. offices of the Gregg Company are located at 19 Rector Street, New York 6, New York.

Cat Transmission Oil Recommendation

A new recommendation covering the use of transmission oils has been announced by Caterpillar Tractor Co., Peoria, Illinois. Caterpillar now recommends that only an extreme pressure transmission oil conforming to the requirements of Mil-L-2105 specifications be used in the final drive compartments and transmissions of D8 tractors torque converter drive (Series D), D8 tractors direct drive (Series E), D9 tractors and No. 583 pipelayers. The company is now filling transmissions and final drives of these units with Mil-L-2105 oil.

The Mil-L-2105 oils which are filterable may also be used in the transmissions and final drives of all other Caterpillar track-type tractors, wheel-type tractors and motor grades. Formerly Caterpillar had recommended the use of straight mineral oils. However, experience has shown that Mil-L-2105 is superior to straight mineral oils. The company stresses, however, that it is important to use the correct oil because some Mil-L-2105 transmission oils are not filterable. Additives in some of these oils may plug the transmission and final drive filters in a very short time. To determine which Mil-L-2105 lubricants are filterable, equipment owners should consult local oil distributors.

Viscosity or "grade" recommend by Caterpillar for various temperatures has not been changed. These are: Below freezing, SAE No. 80; Above freezing, SAE No. 90; Continuous operation in extremely hot temperature, SAE No. 140.

Unusual Adaptation

The ingenuity of Stewart & Stevenson Services engineers has made diesel engines perform in a number of unexpected ways for a great variety of industries. Recently Stewart & Stevenson, through its dealer Mike Carter Engine Works of Wichita Falls, Texas, was called on to install an engine in an ore train for a mining operation for Certainteed Products Co. at Acme, Texas. The tunnels of the mine were so low that they would not allow passage of a conventional horizontal engine.

To keep the low profile on the locomotive, Stewart & Stevenson's engineers took a standard Model 6-71 General Motors diesel and modified the lubrication system and the entire assembly so that it could be laid over on its side in the actual installation. The pistons and cylinders are actually horizontal in the position that the engine is located in the crane. The radiator was also adapted to fit the low engine by the use of two small single fans instead of one large one. The engine is equipped with an Allison torque convertor.

IT'S HERE! JUST OFF THE PRESS! Bigger, better, completely revised, rewritten and brought up to date. It's Volume 20 of DIESEL ENGINE CATALOG, now ready for mailing. Mail orders are now being filled for this giant reference book with its all-new, profusely illustrated engine and accessory sections. Be sure of your copy of this limited edition, which costs $10 postpaid plus California sales tax where applicable. Send checks or company form orders to DIESEL PROGRESS, Cole Station, Los Angeles 46, California.

What can *HARBORMASTER OUTBOARD PROPULSION* do for you?

Harbormasters are complete marine power and steering units . . . *in one package . . . easily installed for immediate use* . . . combining outboard maneuverability with heavy-duty performance. Shown here are just some of the uses where their great maneuverability and heavy-duty performance are paying off.

If you need easily installed power, better steering control, safety in shallow water, easier maintenance, more efficient performance, simpler hull design, more cargo space, bigger payloads, or simplified crew operation . . . you should investigate the benefits of Harbormaster Outboard Propulsion and Steering.

In the new Harbormaster Catalog you'll find detailed information and also many interesting Harbormaster installation photos. Send for your copy today.

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West Coast Diesel News

By James Joseph

TWO GM 6-71 marine diesels will drive each of three 40-ft personnel boats now being built by Anderson Christofani for Holmes & Narver, Los Angeles. The firm will use them in the Pacific.

ANOTHER FAIRBANKS MORSE – a model 45B3-⅛, 3 kw—has gone to Hall Electric Co., Inc., Fairbanks, Alaska.

NATIONAL STEEL & Shipbuilding Co., San Diego, has taken delivery of a Fairbanks Morse model 38D8-⅛, 960 hp, six cylinder marine engine.

FOR OPERATION IN Korea, Morrison-Knudson Co., San Francisco, has ordered a 100 kw diesel generator set, driven by a GM 6-71.

POWERING PRECISION Lumber Co's sawmill (Spokane, Wash.) is a 200 hp, NHI-600 Cummins, sold by Cummins Diesel Sales, Inc., Spokane.

FOR REPOWERING a Koehring Log Loader, a GM 4-71 industrial power unit to J. J. Bartle, Fall River Mills, Shasta County, Calif.

SANITARY PLUMBING and Electric Co., Merced, Calif., has purchased a 60 kw GM diesel set using a 6-71 for installation at Badger Pass Ski Resort (Yosemite National Park). Set works with another similar unit, providing lift's electricity.

TO COWLITZ County Road Dept., Kalama, Wash., a model HP-351 Buda diesel for repowering a 15-B Bucyrus-Erie shovel.

TO CALDWELL, Idaho's Bob Muncy, a 6DA-844 Buda for repowering a LFD-405 International truck, hauling in the Boise area.

FOR THE SAILING ketch *Sonja H*, a GM 4-51 marine diesel. Yacht belongs to George L. Holland who plans to have engine installed in Miami, then sail ketch to its Moss Landing, Calif. base.

STEPHENS BROS., Stockton, Calif. boat builders, will power a new 65-ft cruiser with two GM 6-110s, with 2:1 reduction, heat exchanger cooling and hydraulic reverse gears.

DELIVERED TO Newport Beach, Calif.'s Napdon, Inc., a Buda 6DAMR-182 marine diesel.

A 175 HP, JT-6-B Cummins diesel will replace a F-900 Ford truck's gasoline engine for over-road hauling by Smith Gandy, Seattle, Wash.

FOR THE CRAB fishing boat owned by C. F. Damon, Bay Center, Wash., a 105 hp, JF-6-M Cummins engine. Sale via Cummins Diesel Sales of Washington.

TO EDWARD B. DOOLITTLE, Grass Valley, Calif., a Fairbanks Morse 49B1½, 135 hp, 6 cylinder diesel unit.

LOU THRAILKILL, Seattle, has taken delivery of a 125 hp, JN-6-M Cummins for marine application.

REPOWERING a Southern Pacific Railway Ohio Locomotive 25-ton crane is a model 4082 GM 4-71 diesel, rigged with an Allison torque converter.

FROM GASOLINE to diesel is decision of Granite Construction Co., Watsonville, Calif., who is repowering a 22-B Bucyrus-Erie dragline with a 3-71 GM industrial diesel.

SAN FRANCISCO'S George W. Knease Co., building a tow boat for W. R. Grace Co., has powered craft with a 4-71 GM marine diesel, 3:1 reduction. Craft is for use in South American operations.

You a target?

Let's face it . . . we're all targets!

If your plant is not ready with a disaster plan, better act now. There's not a single American plant that's out of range of an intercontinental bomber—and fires, floods, tornadoes or explosions can kill you just as dead as an atom bomb.

It costs next to nothing to take a few simple steps which may save hundreds of lives. Here they are. Check them off today.

☐ **Call your local** Civil Defense Director. He'll help you set up a plan for your offices and plant—a plan that's safer, because it's integrated with community Civil Defense action.

☐ **Check contents** and locations of first-aid kits Be sure they're adequate and up to date. Here, again, your CD Director can help. He'll advise you on supplies needed for injuries due to blast, radiation, etc.

☐ **Encourage personnel** to attend Red Cross First-Aid Training Courses. They may save your life.

☐ **Encourage your staff** and your community to have their homes prepared. Run ads in your plant paper, in local newspapers, over TV and radio, on bulletin boards. Your CD Director can show you ads that you can sponsor locally. Set the standard of preparedness in your plant city. There's no better way of building prestige and good community relations—and no greater way of helping America.

Act now . . . check off these four simple points . . . lives are at stake . . . have you a right to delay?

SPACE FOR THIS **CIVIL DEFENSE** MESSAGE CONTRIBUTED BY

Ry F. Hadman

PACIFIC TELEPHONE and Telegraph Co. has purchased a 30 kw GM diesel generator set, driven by a GM 3-71, for their marine maintenance barge, operating in San Francisco bay.

GOVERNMENT-OWNED WESTERN shipyards will reconvert 9 of 26 existing Navy warships tabbed for modernization during the fiscal year. To Puget Sound Naval Shipyard goes job of reworking two aircraft carriers; Mare Island Navy Shipyard will convert three radar picket vessels and a heavy cruiser; for San Francisco Naval Shipyard, an attack cruiser; Long Beach Naval Shipyard will rework two picket vessels.

ARBA Convention

ARBA's 54th National Convention at Miami Beach, Jan. 11-14, is expected to draw a record attendance. Heavy hotel reservations have already been made. Intense interest of the road builders will center on first-hand, high-level reports on the prospects for approval of an accelerated national highway program. Delegates will hear directly from the highway legislative leaders of the U.S. Senate and House of Representatives as well as top figures in the Federal Executive Branch.

It will be the first national meeting of leaders of all segments of the highway industry and engineering profession since last summer's defeat in Congress of highway proposals. The American Road Builders will hear all sides and the latest legislative plans and, before the Convention ends, will draw up recommendations representing their viewpoint on the soundest approach to an expanded Federal-aid road program. Because of the status of national highway legislation, the Miami Beach Convention will draw a record registration of road officials and an unprecedented number of contractors, engineers and industry executives. A colorful, informational exhibit of highway materials and supplies will be held in the handsome, modern Miami Beach Municipal Auditorium, with the General Convention Sessions also conducted under the same roof.

GM Motorama

General Motors will send a new and expanded version of its spectacular industrial show, the Motorama, to Los Angeles for a nine-day appearance in Pan Pacific Auditorium, Mar. 5-11, 1956, it was announced by GM President Harlow H. Curtice.

"Although the Motorama will offer the public a unique opportunity of viewing under one roof our complete line of 1956 cars, trucks, household appliances, and other products," Mr. Curtice said, "it will be, as in past years, far more than a product display." Besides market products and advanced design "dream cars," the GM president said the 1956 Motorama will also include the most extensive array of GM engine division exhibits—those of the Euclid, Electro-Motive, Detroit Diesel, Cleveland Diesel, and Allison divisions—ever assembled for a Motorama.

Appointed Euclid Advertising Manager

V. L. Snow, director of Sales for Euclid Division of General Motors Corporation in Cleveland, Ohio, has announced the appointment of R. E. Keidel as manager of the Advertising and Sales Promotion department. Keidel, with Euclid for 8 years, has handled publication advertising and all other promotion activities since 1953. He is well known to Euclid dealers and owners throughout the country as a result of extensive field travels and his duties in connection with trade shows including General Motors Powerama in Chicago this past summer.

Process Pump Bulletin

Ingersoll-Rand's new 20-page, 2-color process pumps bulletin now available upon request, fully describes their vertically split, single-stage and two-stage type process pumps. In this bulletin are design features of the pumps, dimension tables, cross sectional and installation views, plus a 2-page chart showing the extensive interchangeability of parts through the entire line of pumps.

These units are built in accordance with latest API specifications. The range of coverage is from 1 to 8 inches including capacities to 3200 gpm, heads to 925 ft., at temperatures to 800°F. For copies of this new bulletin, Form 7094-B, contact your nearest I-R branch office, or write to Ingersoll-Rand Company, 11 Broadway, New York 4, N.Y.

GM Branch at Tampa, Fla.

The new location of the General Engine & Equipment Co. was opened a few months ago according to J. H. Dyble president of the firm. This new facility which includes over 4800 sq. ft. of shop and sales area serves General Motors diesel engine owners in Hillsboro, Pinellas, Pasco, Manatee, Sarasota, Hernando, Citrus and Polk counties.

The new plant located at 911 East Platt Street in Tampa, Florida, includes a large and complete maintenance department plus a modern parts and sales department. General Engine & Equipment Co. which was started in 1946 is under the direct management of J. H. Dyble.

Lightweight
GRAYMARINE DIESELS
FOR CRUISERS AND WORKBOATS
25 hp 30 hp 50 hp 100 hp 135 hp

New 25 hp DIESEL—Four-D129

For small utility and workboats, and sailing auxiliaries, the new Graymarine Diesel Four-D129 turns up 25 hp at 2000 rpm. Weight is only 656 lbs. including reduction gear. Originally developed for the U.S. Armed Services.

Workboat owners will be particularly interested in Gray's four-cycle Diesel SIX-D427 (shown below) rated 100 hp at 2200 rpm and weighing only 1475 lbs.

Originally developed for and extensively used by the U.S. Navy, this fine Graymarine Diesel reflects the know-how achieved in Gray's sixteen years' experience in manufacturing Diesel marine engines.

DIESEL ENGINES

Four cycle. Horsepower figures are continuous service ratings. Weights include reduction gear.

	HP	RPM	Piston Displ.	Weight (Lbs.)	Length (Inches)
Four-D129	25	2000	129	656	45
Four-D157	30	1800	157	1100	50
Four-D260	50	1800	260	1400	55
Six-D427	100	2200	427	1475	67
Six-D572	135	2200	572	2510	72

GRAY ALSO BUILDS GASOLINE MODELS—16 to 200 hp

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SUBSIDIARY OF CONTINENTAL MOTORS CORPORATION

FOR SALE

2—Fairbanks-Morse Exciter, Serial #X50868—X50904. Type MX. Frame 10A. KW 7½. Shunt wound—60A. 257 RPM. Volts—No Load—Full Load 125 Continuous Duty. 40 deg. C. 125% Load, 2 Hrs. 55 deg. C.

2—Fairbanks-Morse Alternator. Serial #B123 & B120. Type E. Frame V. KVA 95. RPM 257. Ph 3 Cy Co Volts 2400. %P.F. 80 Amps per term 23.0. Field Amp 100% P.F.—80% P.F. 46.0 F. Volts 120. T. Rise 50 deg. C. Cont. Duty.

2—Fairbanks-Morse Diesel. Model 32. HP 120. RPM 257. Style VA. Serial #732775 & 756395.

4—Air Tanks. 250# W.P. 500# T. Circumf. Outside 64¾". Ht. 5'-0".

1—Switchboard. 3—Oil Filters.
1—Air Compressor. 2—Silencers.

Equipment may be seen in operation by contacting Mr. Wayne Richardson, Water Superintendent, c/o Water Works Pumping Station, Belvidere, Illinois.
Bids will be based upon the purchaser removing, crating, and shipping equipment.
Bids will be opened in the City Council Chambers at 1:30 P.M. on February 18, 1956.

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- CRANKPINS TURNED OFF IN PLACE

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NEW YORK

Diesels Ease Flood Damage

At Naugatuck, Conn., the U. S. Rubber Company, Footwear Division, averted a major loss from the flood by quickly removing and salvaging much of their stock. This Caterpillar D397 diesel electric set provided power for the plant during the emergency.

Immediately following the multi-million dollar devastation wrought by the flood waters dumped by Hurricane Diane last year, citizens and industry of the east coast turned their efforts to a gigantic clean-up and reconstruction campaign. Contractors moved their earthmoving machines into the suffering areas quickly, and alongside the local governments' equipment, began, first, to restore communications between the cut-off towns, and then turned to the seemingly endless job of uncovering and removing the debris that was piled yards deep.

In one of the harder hit areas alone, the twin boroughs of Stroudsburg and East Stroudsburg, Pa., just a few miles down the creek from the ill-fated Camp Davis where two score persons lost their lives, 100,000 cubic yards of mud was deposited by the 30 feet of water that deluged the cities. It had to be removed before reconstruction could begin. Exactly adjacent to the former site of Camp Davis was one of the many washouts experienced by the Lackawanna Railroad (D., L. & W.). The rebuilding of the damage along the line required moving 1,000,000 cubic yards of dirt to replace over 30 miles of lost right-of-way, according to reports from the area.

In Connecticut the situation was similar. Winsted, Putnam, Unionville, Collinsville, Waterbury and Naugatuck were among the hardest struck communities. Streets, highways, factories, buildings, homes — all show the results of the creeks and rivers that swelled to such unbelievable heights.

Director of Engineering

Angus J. O'Brien

Edward F. Fisher, president, Gar Wood Industries, Inc., Wayne, Michigan, has announced the appointment of Angus J. O'Brien to the newly created position of vice-president and director of Engineering and Manufacturing. Mr. O'Brien has been with Gar Wood Industries, Inc., as vice-president and director of Manufacturing since 1949. He came to Gar Wood from Fisher Body Division, General Motors Corporation. His early training was with the Ford Motor Company.

Gar Wood Industries, Inc., manufactures truck equipment and road building and construction machinery. Other products of the corporation include automotive wheel trim, resistance and arc welding cable and custom stampings. A New Chemical Products Division has recently been created.

DIESEL ELECTRIC POWER

STATIONARY • PORTABLE • MOBILE

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Cleveland Cliffs Iron Works

Municipal Power Plant, Herkimer, N.Y.

100 KW to 1500 KW—A.C. and D.C. in All Sizes
Specialists in Design for Your Requirements

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A. G. SCHOONMAKER COMPANY, INC.

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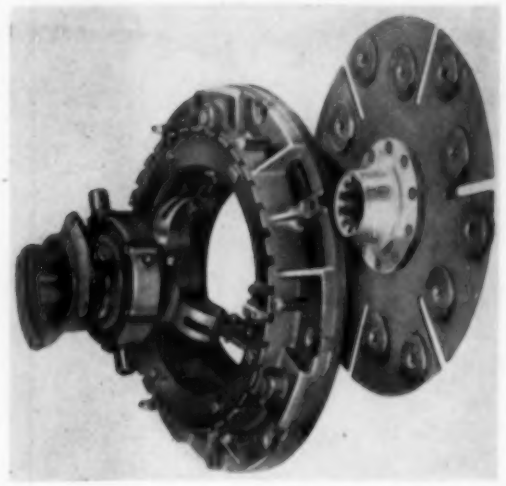
Rockford "Morlife" Clutches



New type clutches have been developed and field tested by engineers of the Rockford Clutch Division of Borg-Warner Corp. specifically for heavy-duty clutch service. The new clutches are offered under the trade-mark name of "Morlife." Extensive tests have shown that the extra tough characteristics of the Morlife clutch plates used in these new Rockford clutches are well adapted for heavy duty machines such as tractors, trucks, cranes, shovels, bulldozers, tanks, earth movers, graders, and other heavy machines. Rockford engineers state that field tests show that the Morlife type clutches provide up to 100 per cent more torque capacity and permit the use of smaller diameter, less expensive clutches. Another important advantage is that less lever or pedal pressure is required for engaging and disengaging.

The work life of the Morlife clutches has been increased as much as 400 per cent, cutting down time for adjustments or replacements to one-fourth. Heat dissipation has been improved to the extent that excessively burned or warped clutch plates have been eliminated. Torque does not fade as heat increases. The new Rockford clutches are recommended for use only when specifically engineered into the machines in which they are to serve. For this reason Rockford Clutch engineers urge that complete information about Morlife type clutches be obtained before installation in any machine. Information covering specific applications can be obtained by writing Department E, Rockford Clutch Division, Borg-Warner Corporation, 1301–18th Avenue, Rockford, Ill. (ITS NEW)

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Your broken diesel cylinder heads

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- All ferrous and many non-ferrous castings, simple or complex, can be restored by the Guth Fusion Process.

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Phone: ALpine 4-0391

GUTH-PASCOE COMPANY

Towboat Being Added to Fleet

Another Nordberg Supairthermal engine powered towboat is being added to the fleet of the Material Service Corporation, Chicago, Illinois. The engines for this twin screw towboat are being built at Nordberg's St. Louis plant and are of the direct drive, direct reversing marine diesel type. Each of the two Nordberg 4-cycle, 6-cylinder, Supairthermal engines are rated 800 hp at 273 and operate at 176 lbs. bmep.

Slightly larger than the *Irving Crown*, the first Material Service Corporation boat to be powered by Nordberg Supairthermal engines, the new boat will be 110 ft long, with a 30 ft beam and a draft of 8 ft. She will be 7 ft longer than the *Irving Crown*, have greater fuel capacity and provide even more spacious quarters for the crew. The vessel will operate on the Illinois Waterway and like the *Irving Crown* will have a retractable pilot house to enable her to clear low, fixed bridges. This telescoping pilot house will be equipped with direct engine controls. The yet unnamed vessel is being built in the Chicago yards of the Calumet Shipyard and Drydock Company according to ABS specifications.

Florida Sport Fisherman

Engineered and designed to the highest sea safety standards, the *Day Dream I* is Capt. H. L. Pierce's idea of a sound party fishing boat. Her uncluttered open deck is fitted with outriggers and fighting chairs for offshore fishing. *Day Dream I* is 33 ft. over-all with a beam of 11 ft. Her new General Motors 4-51 diesel with Paragon 1.5:1 r&r gears and an 18x12 Columbian propeller gives her ample speed for party fishing.

The craft is owned by Capt. H. L. Pierce of Maderia Beach, Florida.

IT'S HERE! JUST OFF THE PRESS! Bigger, better, completely revised, rewritten and brought up to date. It's Volume 20 of DIESEL ENGINE CATALOG, now ready for mailing. Mail orders are now being filled for this giant reference book with its all-new, profusely illustrated engine and accessory section. Be sure of your copy of this limited edition, which costs $10 postpaid plus California sales tax where applicable. Send checks or company form orders to DIESEL PROGRESS, Cole Station, Los Angeles 46, California.

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If you need one or more trained Diesel mechanics, our Placement Service can send you the energetic kind that every employer dreams about—fellows who *drive themselves* . . . These are men who have proved they have the inner drive by investing hundreds of hours and hundreds of dollars of *their own money* for Diesel training, and are now eager to go to work at any Diesel job, anywhere you say. Just tell us your requirements, and we will endeavor to supply the men to meet them.

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CHICAGO 14, ILLINOIS

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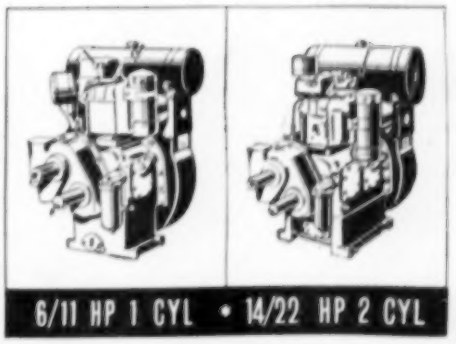

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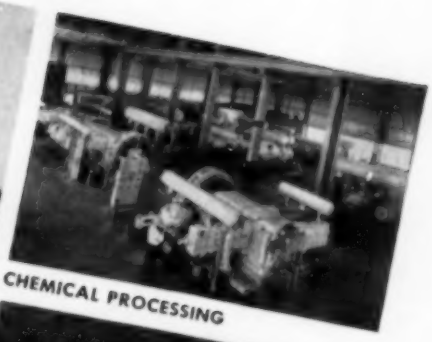

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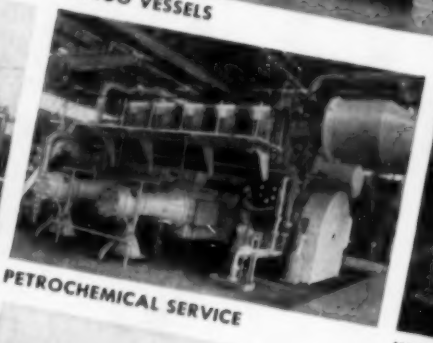

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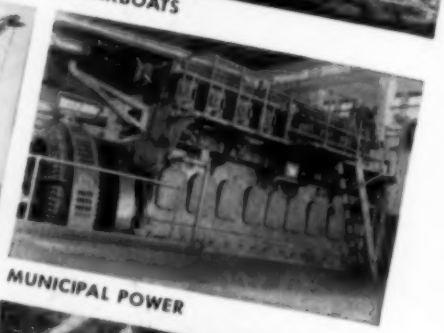

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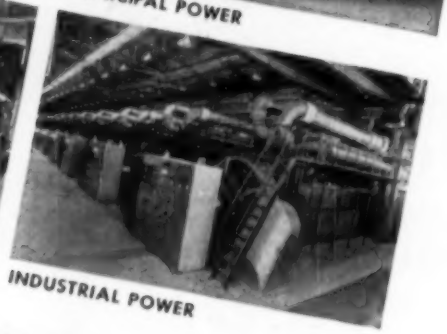

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